

July 11, 2003

Refer to: HSA-10/CC-83

Barry D. Stephens, P.E.
Senior Vice President of Engineering
ENERGY ABSORPTION Systems, Inc.
3617 Cincinnati Avenue
Rocklin, California 95765

Dear Mr. Stephens:

In your June 13, 2003, letter, you requested the Federal Highway Administration's (FHWA) acceptance of a low-speed truck mounted attenuator (TMA) called the LS-Pro TMA for use on Federal-aid projects as a National Cooperative Highway Research Program (NCHRP) Report 350 Test Level 1 (TL-1) device. As noted in your letter, tests for TMAs at impact speeds lower than 70 km/h (TL-2) are not formally recognized in Report 350. However, the crash test evaluation criteria for a low speed TMA would logically remain the same as those for higher speed impacts so a TMA that meets all performance requirements for a TL-2 device at the TL-1 impact speed of 50 km/h could be considered acceptable.

To support your request, you provided copies of a December 1994 abbreviated report by E-TECH Testing Services, Inc., entitled "Low Speed TMA Crash Test Report" and a June 2003 report entitled "NCHRP Report 350 Crash Test Results for the LS-Pro TMA." These reports contained data on modified versions of NCHRP Report 350 tests 2-50 and 2-51, which are the basic tests required for acceptance of a TMA. The only modification was the impact speeds, which were 50 km/h rather than 70 km/h.

The LS-Pro TMA consists of an aluminum cartridge with a Durashell nose, a backup assembly, and a backup support structure for attaching the unit to its support vehicle. Its total weight is approximately 409 kg. The LS-Pro components were initially used in your ALPHA 2001 MD TMA that was originally tested and accepted under NCHRP Report 230 guidelines in 1994. A schematic drawing of the LS-Pro TMA is included with this letter as Enclosure 1. Enclosure 2 includes summary data on the two tests that were run. The 8550-kg support vehicle was blocked to prevent forward movement in the small car test, and an 8595-kg support truck rolled forward 1.1 m after impact by the pickup truck.

Based on the information you provided and staff analysis of the data, I agree that the LS-Pro TMA, as designed and tested, meets the appropriate crash evaluation criteria inferred in NCHRP

Report 350 for a TL-1 truck-mounted attenuator. It may be used on the National Highway System (NHS) when impact speeds are expected to be in the 50-km/h range and its use is acceptable to the appropriate highway agency. As with all TMAs, this acceptance is based on its reported crash test performance and is not intended to address other factors such as durability, the mobility of the support vehicle, road-induced vibrations, maintainability, or the influence of moisture and temperature variations. Since it is a proprietary product, its use on the NHS is subject to the provisions of Title 23, Code of Federal Regulations, Section 635.411 when such use is specified by the contracting agency.

Sincerely yours,

(original signed by Michael S. Griffith)

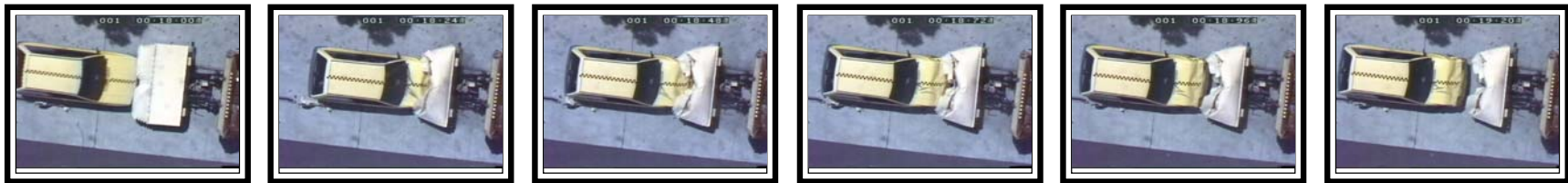
Michael S. Griffith
Acting Director, Office of Safety Design
Office of Safety

2 Enclosures

FHWA:HSA-10:RPowers:tb:x61320:7/9/03

File: h://directory folder/rpowers/CC83(LS-ProTMA)

cc: HSA-10 (Reader, HSA-1; Chron File, HSA-10;
R.Powers, HSA-10)



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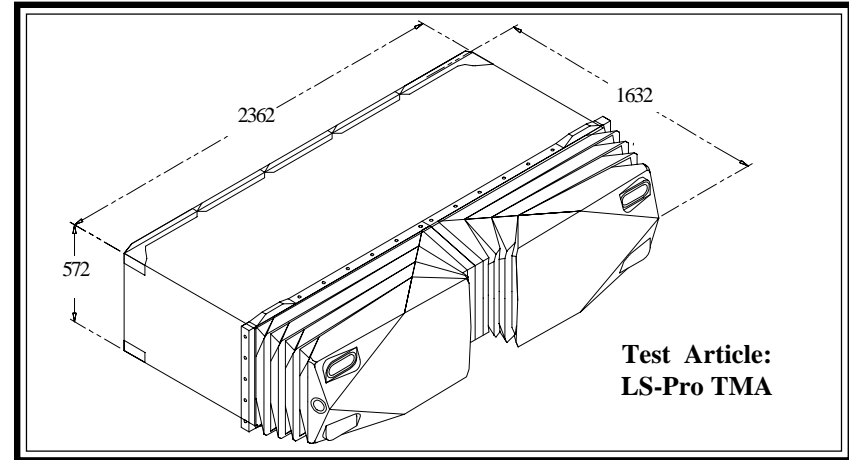
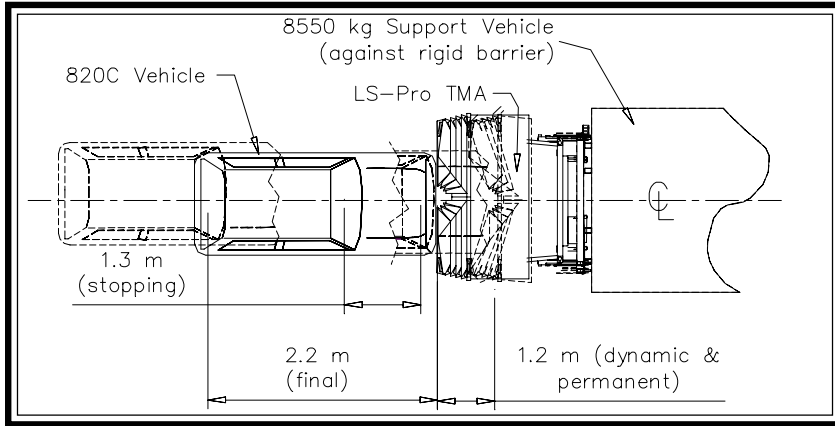
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Test Article:
LS-Pro TMA

General Information

Test Agency	E-TECH Testing Services, Inc.
Test Designation	NCHRP 350 Test 2-50 (modified)
Test No.	01-5500-004
Date	5/23/03
Test Article	
Type	Energy Absorption Systems, Inc.
.....	LS-Pro TMA
Length (mm)	1632 (cartridge)
Material and key elements	Aluminum Cartridge; LxHxW
.....	1632 mm x 572 mm x 2362 mm
Foundation Type and Condition	Concrete, clean and dry
Test Vehicle	
Type	Production Model
Designation	820C Small Car
Model	1990 Ford Festiva
Mass (kg)	
Curb	871
Test inertial	841
Dummy	75
Gross Static	916
Support Vehicle	
Model	1970 GMC 7500 T/A Dump
Test Inertial Mass (kg)	8550
Restraint	Against rigid barrier
Impact Conditions	
Speed (km/h)	50.0
Angle (deg)	0
Impact Severity (kJ)	81.1

NCHRP 350 Occupant Risk Values

Impact Velocity (m/s)	11.8
x-direction	0.01
y-direction	0.01
Ridedown Acceleration (g's)	
x-direction	-11.2
y-direction	-1.4
Support Vehicle Acceleration (g's)	
x-direction	N/A
European Committee for Normalization (CEN) Values	
THIV (km/h)	42.4
PHD (g's)	14.6
ASI	1.2
Test Article Deflections (m)	
Dynamic	1.2
Permanent	1.2
Vehicle Damage	
Exterior	
VDS	FD-2
CDC	12FDEW2
Interior	
OCDI	AS0000000
Deformation (mm - max)	Negligible
Post-Impact Vehicular Behavior (deg - rate gyro)	
Maximum Roll Angle	1.0
Maximum Pitch Angle	-4.5
Maximum Yaw Angle	-0.9

Figure 1. Summary of Results - LS-Pro TMA Test 01-5500-004



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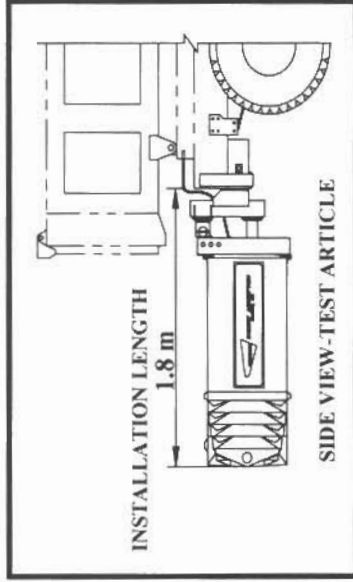
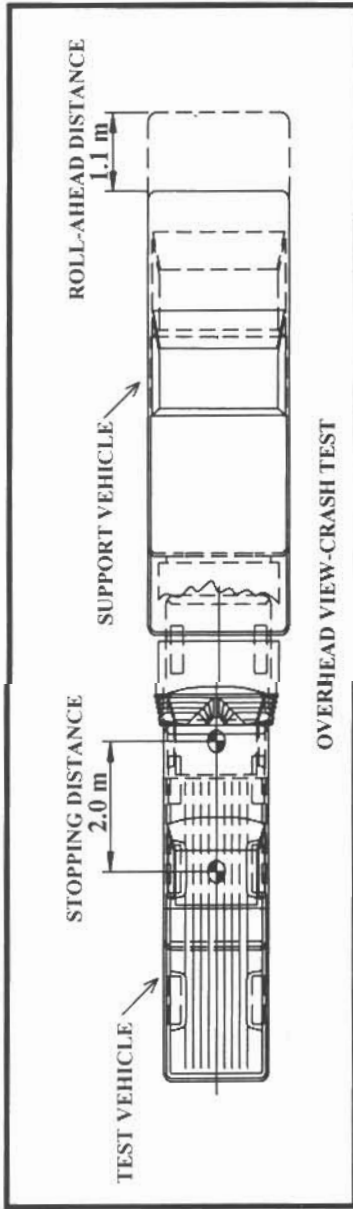
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General Information.

Test No. 181-001
 Date 8/32/94

Test Article

Type TMA
 Installation Length (m) 1.8
 Size and/or dimension and material
 of key elements N/A

Soil Type and Condition Clean, dry, pavement

Test Vehicle

Type Production Model
 Designation 2000P
 Model 1988 Chevy
 3/4 Ton P/U

Mass - (kg)
 Curb 1936
 Test inertial 1958
 Dummy(s) 0
 Gross Static 1958

Impact conditions

Speed (km/h) 53.7
 Angle (deg) 0
 Impact Severity (kJ) 217.6

Exit conditions

Speed (km/h) N/A
 Angle (deg) N/A

Occupant Risk Values

Impact Velocity (m/s)
 x-direction 11.1
 y-direction N/A
 Ridedown Acceleration (g's)
 x-direction 16.2
 y-direction 2.4

Acceleration Severity Index
 Vehicle Damage

VDS FD-3
 CDC 12FDEW2

Post-Impact Vehicular Behavior

Stopping Distance - (m) 2.0
 Truck Roll-ahead - (m) 1.1

Figure 2. Summary of Results - Low Speed TMA™ Test 181-001
 NCHRP 350 Test 2-51 (Modified)