



U.S. Department
of Transportation
**Federal Highway
Administration**

December 17, 2013

1200 New Jersey Ave., SE
Washington, D.C. 20590

In Reply Refer To:
HSST/ B-245

Mr. Mathew Harriman
Hill and Smith, Ltd.
Bilston, Wolverhampton
West Midlands, WV14 OQL
United Kingdom

Dear Mr. Harriman:

This letter is in response to your request for the Federal Highway Administration (FHWA) to review a roadside safety system for eligibility for reimbursement under the Federal-aid highway program.

Name of system: Brifen Wire Rope Safety Fence O-Post, MASH
Type of system: Longitudinal Barrier
Test Level: AASHTO MASH TL3
Testing conducted by: Southwest Research Institute (SwRI)
Task Force 13 Designator: SGM37
Date of request: October 6, 2013
Date of completed package: November 15, 2013

Decision:

The following device is eligible, with details provided in the form which is attached as an integral part of this letter:

- Brifen Wire Rope Safety Fence O-Post, MASH

Based on a review of crash test results you submitted certifying the device described herein meets the crash test and evaluation criteria of the American Association of State Highway and Transportation Officials' Manual for Assessing Safety Hardware (MASH), the device is eligible for reimbursement under the Federal-aid highway program. Eligibility for reimbursement under the Federal-aid highway program does not establish approval or endorsement by the FHWA for any particular purpose or use.

The FHWA, the Department of Transportation, and the United States Government do not endorse products or services and the issuance of a reimbursement eligibility letter is not an endorsement of any product or service.

Requirements

To be found eligible for Federal-aid funding, roadside safety devices should meet the crash test and evaluation criteria contained in the American Association of State Highway and Transportation Officials' Manual for Assessing Safety Hardware (MASH).

Description

The device and supporting documentation are described in the attached form.

Summary and Standard Provisions

Therefore, the system described and detailed in the attached form is eligible for reimbursement and may be installed under the range of conditions tested. Please note the following standard provisions that apply to FHWA eligibility letters:

- This letter provides a AASHTO/ARTBA/AGC Task Force 13 designator that should be used for the purpose of the creation of a new and/or the update of existing Task Force 13 drawing for posting on the on-line 'Guide to Standardized Highway Barrier Hardware' currently referenced in AASHTO Roadside Design Guide.
- This finding of eligibility does not cover other structural features of the systems, nor conformity with the Manual on Uniform Traffic Control Devices.
- Any changes that may influence system conformance with MASH will require a new reimbursement eligibility letter.
- Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals safety problems, or that the system is significantly different from the version that was crash tested, we reserve the right to modify or revoke this letter.
- You are expected to supply potential users with sufficient information on design and installation requirements to ensure proper performance.
- You are expected to certify to potential users that the hardware furnished has the same chemistry, mechanical properties, and geometry as that submitted for review, and that it will meet the test and evaluation criteria of the MASH.
- To prevent misunderstanding by others, this letter of eligibility is designated as number B-245 and shall not be reproduced except in full. This letter and the test documentation upon which it is based are public information. All such letters and documentation may be reviewed at our office upon request.
- This letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented system for which the applicant is not the patent holder. The FHWA does not become involved in issues concerning patent law. Patent issues, if any, are to be resolved by the applicant.

- Because it is a steel product, the Brifen Wire Rope Safety Fence O-Post, MASH is subject to Section 635.410 (Buy America) of Title 23, U.S. Code of Federal Regulations, and cannot be permanently incorporated into any federally funded project unless it is made in the U.S. from U.S. steel.

Sincerely yours,

A handwritten signature in blue ink that reads "Michael S. Griffith". The signature is written in a cursive style with a large initial "M" and a stylized "G".

Michael S. Griffith
Director, Office of Safety Technologies
Office of Safety

Enclosures

Request for Federal Aid Reimbursement Eligibility Of Highway Safety Hardware

Submitter	Date of Request:	October 6, 2013	<input checked="" type="radio"/> New <input type="radio"/> Resubmission
	Name:	Matt Harriman	Signature: 
	Company:	Hill and Smith Ltd.	
	Address:	Bilston, Wolverhampton West Midlands, WV14 0QL	
	Country:	UK	
	To:	Michael S. Griffith, Director FHWA, Office of Safety Technologies	

I request the following devices be considered eligible for reimbursement under the Federal-aid highway program.

System Type	Submission Type	Device Name / Variant	Testing Criterion	Test Level
'B': Barriers (Roadside, Median, Bridge Railings)	<input checked="" type="radio"/> Physical Crash Testing <input type="radio"/> FEA & V&V Analysis	Brifen Wire Rope Safety Fence	AASHTO MASH	TL3

By submitting this request for review and evaluation by the Federal Highway Administration, I certify that the product(s) was (were) tested in conformity with the AASHTO Manual for Assessing Safety Hardware and that the evaluation results meet the appropriate evaluation criteria in the MASH.

Identification of the individual or organization responsible for the product:

Contact Name:	Matt Harriman	Same as Submitter <input checked="" type="checkbox"/>
Company Name:	Hill and Smith Ltd.	Same as Submitter <input checked="" type="checkbox"/>
Address:	Bilston, Wolverhampton West Midlands, WV14 0QL	Same as Submitter <input checked="" type="checkbox"/>
Country:	UK	Same as Submitter <input checked="" type="checkbox"/>

PRODUCT DESCRIPTION

New Hardware

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Address:	Bilston, Wolverhampton West Midlands, WV14 OQL	Same as Submitter <input checked="" type="checkbox"/>
Country:	UK	Same as Submitter <input checked="" type="checkbox"/>

PRODUCT DESCRIPTION

New Hardware

The Brifen MASH TL-3 WRSF is a high tension cable barrier that consists four (4) separate wire ropes (cables) interwoven between O-shaped steel posts. The ropes are held at the design height by notches/dimples with a rope retention device (plastic) in the side of the O-shaped steel posts. The total length of the WRSF used in the test was approximately 183 m (600 ft), and it was anchored at each end using Brifen's WRGT-RD terminals. The WRGT-RD terminal was previously accepted to NCHRP 350 Test Level Three (TL-3) by the FHWA (letter HAS-10/CC-86A dated August 10, 2005).

Each of the four wire ropes are 0.75 in (19 mm) in diameter, pre-stretched galvanized steel 3 x 7 construction, with a minimum breaking strength of 39,000 lbs (173.5 kN) and have a modulus of elasticity after pre-stressing of 11,805,00 psi (8,300 kg/mm²). Nominal rope heights (center of rope) are: top 35 in (890 mm), upper middle 28 in (710 mm), lower middle 21 in (530 mm) and bottom 14 in (355 mm). The posts in the test section are round HSS2.875x0.132 and are inserted in steel sockets. The post embedment into the steel socket is 12 in (305 mm). The steel sockets were placed in 12 in (305 mm) diameter concrete footers through the concrete pavement. The first four posts were spaced at 6.5 ft (2.0 m) as part of the WRGT-RD anchor, and the length of need line posts were spaced at a minimum distance of 7 ft (2.1 m) and a maximum distance of 21 ft (6.4 m), depending on the test.

Rigging screws were purposely arranged so they would be located in the area where vehicle-barrier contact occurs to demonstrate that their location does not affect barrier performance.

We request the following for eligibility:

I. Brifen MASH TL-3 Cable Barrier, 4-cable system, for use with O-Post spacing of 7 ft. (2.1 m) through 21 ft. (6.4 m).

All systems can utilize pre-stretched or non pre-stretched cables (ropes), socketed posts in concrete footings, driven posts, surface mounted posts, post cast directly into concrete and driven post sockets. (The sockets are manufactured from either plastic or steel).

CRASH TESTING

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
3-10 (1100C)	Test 1: SwRI Test No. BUSA-OP-03 / Test Date May 23, 2012 @ 7' post spacing (Impact between posts)	PASS
3-11 (2270P)	Test 2: SwRI Test No. BUSA-OP-1/Test Date May 22, 2012 - @ 7' post spacing (Impact on post - establish minimum deflection) Test 3: SwRI Test No: BUSA-OP-2/Test Date May 22, 2012 - @ 21' post spacing (Impact on post - establish maximum deflection)	PASS
3-20 (1100C)		
3-21 (2270P)		

Full Scale Crash Testing was done in compliance with MASH by the following accredited crash test laboratory (cite the laboratory's accreditation status as noted in the crash test reports.):

Laboratory Name:	Southwest Research Institute	
Laboratory Contact:	Karol Hricisak / Jenny Ferren	Same as Submitter <input type="checkbox"/>
Address:	6220 Culebra Road, San Antonio, Texas, 78228	Same as Submitter <input type="checkbox"/>
Country:	USA	Same as Submitter <input type="checkbox"/>
Accreditation Certificate Number and Date:	A2la Certificate Number: 1110.02. March 31, 2014	

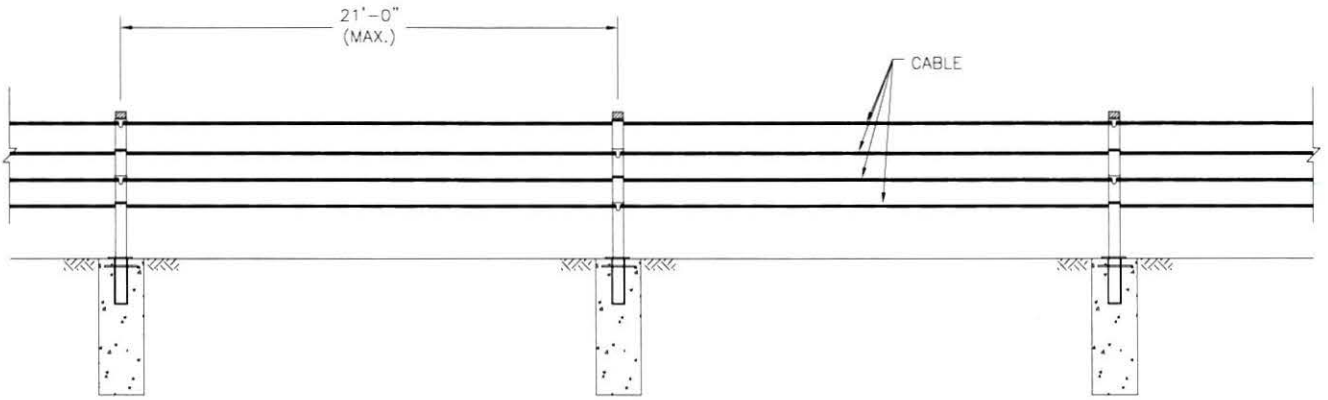
ATTACHMENTS

Attach to this form:

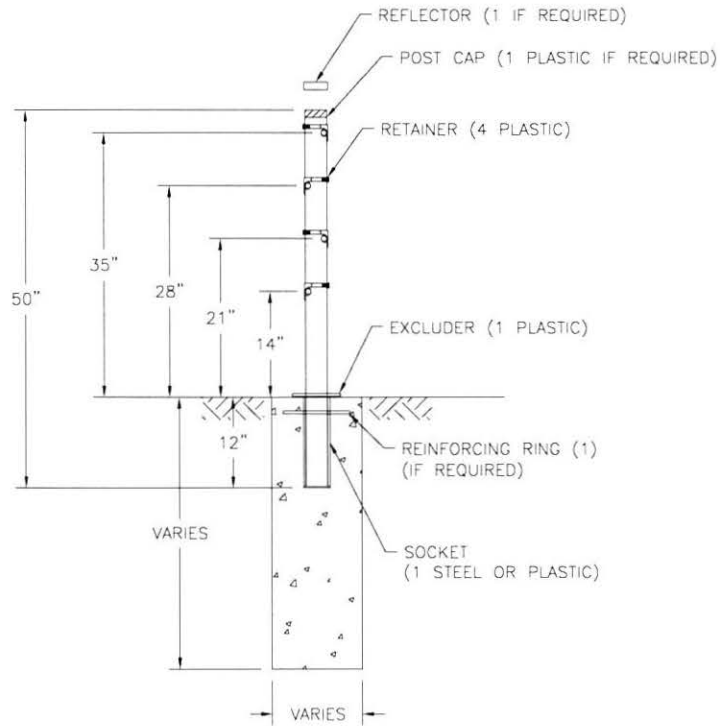
- 1) A copy of the full test report, video, and a Test Data Summary Sheet for each test conducted in support of this request.
- 2) A drawing or drawings of the device(s) that conform to the Task Force-13 Drawing Specifications [[Hardware Guide Drawing Standards](#)]. For proprietary products, a single isometric line drawing is usually acceptable to illustrate the product, with detailed specifications, intended use, and contact information provided on the reverse. Additional drawings (not in TF-13 format) showing details that are key to understanding the performance of the device should also be submitted to facilitate our review.

FHWA Official Business Only:

Eligibility Letter		AASHTO TF13	
Number	Date	Designator	Key Words
B-245	November 19, 2013		Longitudinal Barrier, Wire Rope, Interwoven, OShaped Steel Posts, NCHRP 350 Test Level Three



ELEVATION



SECTION

ROUND STEEL POST CABLE MEDIAN BARRIER

O-POST
MASH

SHEET NO.

DATE:

1 OF 2

10/21/2013

SPECIFICATION

Rope heights shall be ± 1 " to ground line. Post shall be ± 4 " from vertical plumb. Post caps shall be used if specified. Reflectors shall be spaced according to agency specifications. Reflectors can be placed on the post cap or post. O-excluder shall be used. Socket can be steel or plastic. Socket shall be ± 2 " of vertical plumb. Reinforcing ring will be used according to foundation size and type.

INTENDED USE

This O-Post systems must be anchored using Brifen Attachment to Guardrail, Brifen Attachment to Bridge Pier Bracket, Brifen WRGT-FL, WRGT or WRGT-RD anchor. It shall be placed on a smooth surface, without humps, drop-offs, holes, etc, that would interfere with the stability of the errant vehicle. Grading, fill and compaction may be required to assure that ropes are installed at the design height.

COMPONENTS PER POST

QTY	DESCRIPTION
4	Plastic Retainer
1	Plastic Post Cap (if required)
1	Prismatic Reflector (if required)
1	Plastic Excluder
1	Steel or Plastic Socket
1	Reinforcing Ring (per foundation size and type)



12501 N. Santa Fe Ave, Oklahoma City, OK 73114 Phone: 405-751-8062 Fax: 405-751-8338

ROUND STEEL POST CABLE MEDIAN BARRIER

O-POST
MASH

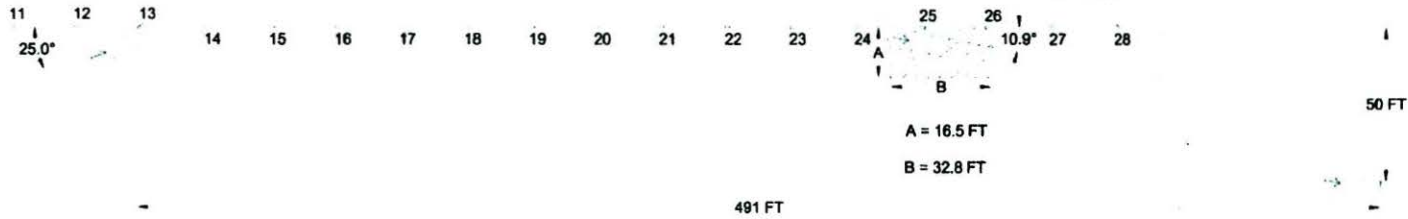
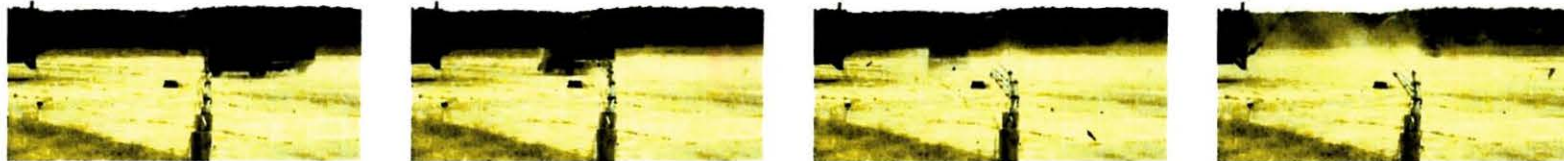
SHEET NO.

DATE:

2 OF 2

10/21/2013

Table 4.1 – Summary of Test Results and Conditions



General Information

Test Agency.....Southwest Research Institute
 Test Number.....BUSA-OP-1
 Test Date.....05/22/2012
 Test Category.....3-11

Test Article

Type.....Longitudinal Barrier
 Installation Length.....187 m (614 ft)
 Nom. Barrier Height.....0.89 m (2.92 ft)
 Type of Primary Barrier.....Wire Rope Safety Fence

Soil

Concrete Footings Embedded in
 Concrete Runaway

Test Vehicle

Type.....¾-ton pickup
 Designation.....2270P
 Model.....2007 C15543
 Mass (kg).....2,269
 Inertial Mass(kg).....2,269
 Dummy Mass (kg).....NA
 Gross Static Mass (kg).....2,269

Impact Conditions

Speed (km/h).....96.2
 Angle (degrees).....25.0

Exit Conditions

Speed (km/h).....92.8 (calculated)
 Angle (degrees).....10.9

Occupant Risk Values

Impact Velocity (m/s)
 x-direction.....1.4
 y-direction.....-2.7
 Ridedown Accelerations (g's)
 x-direction.....-1.8
 y-direction.....2.8

Post Impact Vehicular Behavior

Maximum Roll Angle (degrees).....6.6 @ 5.7858 sec.
 Maximum Pitch Angle (degrees).....-1.9 @ 0.6689 sec.
 Maximum Yaw Angle (degrees).....29.4 @ 3.3388 sec.

Test Article Deflection

Dynamic.....3.6 m (11.9 ft)

Permanent (top of barrier).....0.9 m (3.0 ft)
 Permanent (base of barrier).....0 m (0 in)

Vehicle Damage

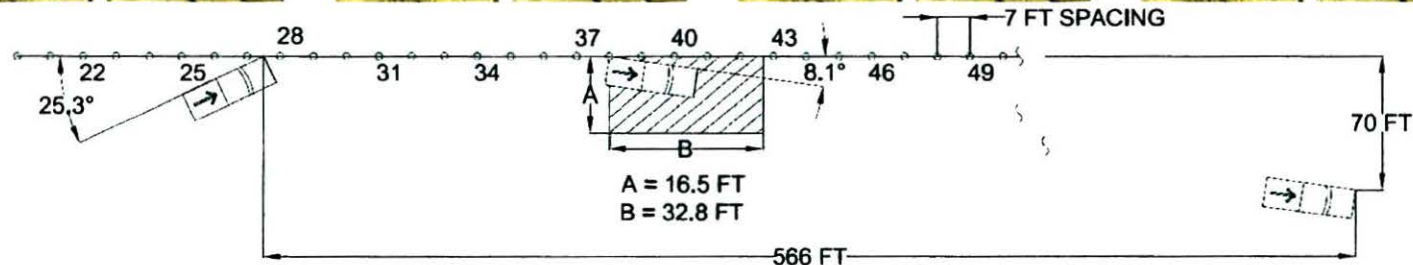
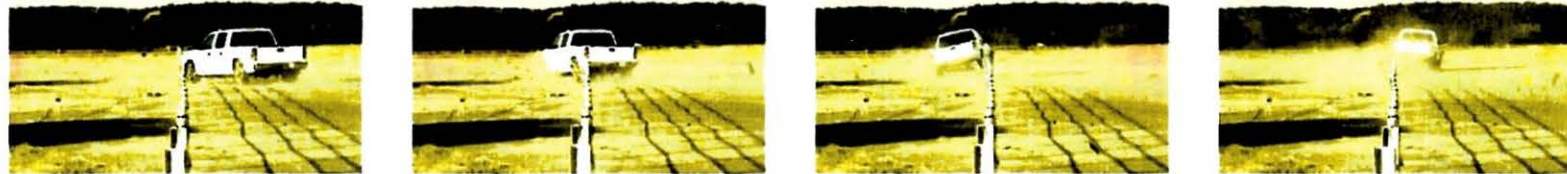
Exterior

CDC.....11LFEW9
 VDS.....11-LFQ-3

Interior

OCDI.....LF0000000
 Max. Deform. (mm).....0

Table 4.1 – Summary of Test Results and Conditions



General Information

Test Agency Southwest Research Institute
 Test Number BUSA-OP-2
 Test Date 05/22/2012
 Test Category 3-11

Test Article

Type Longitudinal Barrier
 Installation Length 187 m (614 ft)
 Nom. Barrier Height 0.89 m (2.92 ft)
 Type of Primary Barrier Wire Rope Safety Fence

Soil

Concrete Footings Embedded in
 Concrete Runaway

Test Vehicle

Type ¾-ton pickup
 Designation 2270P
 Model 2007 C15543
 Mass (kg) 2,260
 Inertial Mass(kg) 2,260
 Dummy Mass (kg) NA
 Gross Static Mass (kg) 2,260

Impact Conditions

Speed (km/h) 97.7
 Angle (degrees) 25.3

Exit Conditions

Speed (km/h) 78.6 (calculated)
 Angle (degrees) 8.1

Occupant Risk Values

Impact Velocity (m/s)
 x-direction 2.6
 y-direction 3.2
 Ridedown Accelerations (g's)
 x-direction 3.5
 y-direction 4.0

Post Impact Vehicular Behavior

Maximum Roll Angle (degrees) 14.7 @ 1.0979 sec.
 Maximum Pitch Angle (degrees) -6.8 @ 5.7354 sec.
 Maximum Yaw Angle (degrees) 32.0 @ 1.5836 sec.

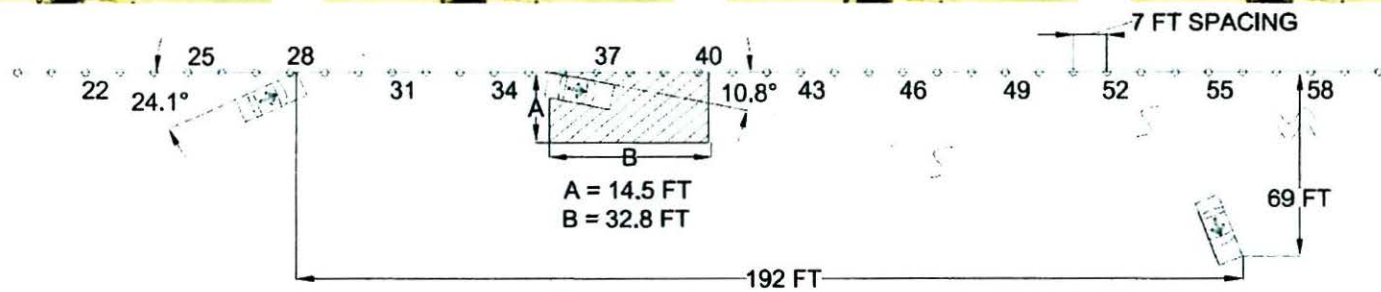
Test Article Deflection

Dynamic 2.4 m (8.0 ft)
 Permanent (top of barrier) 0.9 m (3.0 ft)
 Permanent (base of barrier) 0 m (0 in)

Vehicle Damage

Exterior
 CDC 11LFEW9
 VDS 11-LFQ-3
 Interior
 OCDI LF0000000
 Max. Deform. (mm) 0

Table 4.1 – Summary of Test Results and Conditions



General Information

Test AgencySouthwest Research Institute
 Test NumberBUSA-OP-3
 Test Date05/23/2012
 Test Category3-10

Test Article

TypeLongitudinal Barrier
 Installation Length187 m (614 ft)
 Nom. Barrier Height0.89 m (2.92 ft)
 Type of Primary BarrierWire Rope Safety Fence

Soil

Concrete Footings Embedded in
 Concrete Runaway

Test Vehicle

Typecar
 Designation1100C
 Model2003 7 C15543
 Mass (kg)1,155
 Inertial Mass(kg)1,080
 Dummy Mass (kg)75
 Gross Static Mass (kg)1,155

Impact Conditions

Speed (km/h)103.9
 Angle (degrees)24.1

Exit Conditions

Speed (km/h)69.1 (calculated)
 Angle (degrees)10.8

Occupant Risk Values

Impact Velocity (m/s)
 x-direction3.8
 y-direction4.0
 Ridedown Accelerations (g's)
 x-direction-7.8
 y-direction8.9

Post Impact Vehicular Behavior

Maximum Roll Angle (degrees)8.3 @ 6.0981 sec.
 Maximum Pitch Angle (degrees)-4.8 @ 0.5220 sec.
 Maximum Yaw Angle (degrees)91.0 @ 6.3452 sec.

Test Article Deflection

Dynamic1.6 m (5.1 ft)
 Permanent (top of barrier)0.9 m (3.0 ft)
 Permanent (base of barrier)0 m (0 in)

Vehicle Damage

Exterior

CDC11LFEA9
 VDS11-LFQ-5

Interior

OCDILF0000000
 Max. Deform. (mm)91