U.S. Department of Transportation
Federal Highway Administration

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

June 27, 2022

In Reply Refer To:
HSST-1/WZ-438

Kevin Harrison
Eastern Metal of Elmira, Inc.
1430 Sullivan Street
Elmira NY 14901
USA

Dear Mr. Harrison:

We received your correspondence of April 21, 2021 requesting issuance of a reimbursement eligibility letter under the Federal-aid highway program for the roadside safety system, device, design, product, or hardware (collectively "device") described below. This letter is assigned Federal Highway Administration (FHWA) control number WZ-438.

ELIGIBILITY LETTERS

The FHWA issues Federal-aid reimbursement eligibility letters for new roadside safety devices that are crash tested in accordance with the industry standard of the American Association of State Highway and Transportation Officials (AASHTO) Manual for Assessing Safety Hardware (MASH).

FHWA, the Department of Transportation, and the United States (government) do not regulate roadside safety devices, crash test facilities, or the manufacturing industry. Issuance of eligibility letters is discretionary and provided only as a service to the states. FHWA may, at its discretion, decline to issue, revise, or rescind an eligibility letter. Eligibility letters are only issued by the FHWA headquarters Office of Safety.

Eligibility letters are issued only as notice to the states that a device is eligible for reimbursement under the Federal-aid highway program. They do not establish approval or certification for any other purpose. Issuance of an eligibility letter is not a prerequisite or requirement for state transportation agencies seeking to use Federal-aid funds for roadside safety devices. State agencies may use a device for which an eligibility letter has not been issued and seek Federal-aid reimbursement.

FEDERAL-AID REIMBURSEMENT

The request for issuance of this letter certified the device was crash tested in accordance with the industry standard of AASHTO's MASH. This eligibility letter is based on that certification and the material offered in support of its issuance. The device described below is eligible for reimbursement under the Federal-aid highway program.

Name of system: Apex Dual Recoil Max w/ Roll-Up Sign
Type of system: Work Zone Sign Stand
Test Level: Test Level 3
Testing conducted by: Calspan Corporation
Date of request: April 21, 2021

Information about the device, including material such as the eligibility request, crash test reports, drawings, or images are included in one or more attachment(s) to this letter.

Eligibility letter WZ-438 is inapplicable to devices, optional equipment, alternate materials, or other features that were not crash tested in accordance with AASHTO's MASH.

This letter is issued only for the subject device as crash tested under AASHTO's MASH. Later modification(s) of the device are not eligible for Federal-aid reimbursement under this letter. Notice of later modification(s) should be given to transportation agencies, facility owners, and operators (collectively "agencies").

Agencies should be provided appropriate information about the device's design, installation, maintenance, materials, and mechanical properties.

Issuance of this letter is discretionary, and it may be revised or rescinded at FHWA's discretion. This letter is not a determination of compliance with the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) or ownership of any intellectual property rights.

This eligibility letter is not a determination by the government that a crash involving the subject device will result in any particular outcome. It is limited to only the device's eligibility for Federal-aid reimbursement.

INTELLECTUAL PROPERTY

Issuance of this eligibility letter does not convey property rights of any sort nor any exclusive privilege. This letter is not authorization or consent by the government for the use, manufacture, or sale of any patented or proprietary system, device, design, product, or hardware for which the requester is not the patent owner. Eligibility letters are not an expression of any view, position, or determination by the government as to the validity, scope, or ownership of any intellectual property rights to a specific device. These letters do not grant, impute, suggest, or otherwise establish any ownership, distribution, or licensing rights to the requester. The government expresses no opinion about the intellectual property rights relating to any device for which this or any other eligibility letter is issued.

PUBLIC DISCLOSURE

To prevent any misunderstanding, and as discussed above, this eligibility letter is assigned FHWA control number WZ-438. It should only be reproduced in full with its attachment(s). This letter and the material offered by the requester supporting its issuance is public information. All eligibility letters and supporting material are subject to public disclosure under the Freedom

of Information Act (FOIA). Eligibility letters are available to the public at https://safety.fhwa.dot.gov/roadway_dept/countermeasures/reduce_crash_severity/.

If you have any questions please contact Aimee Zhang at Aimee.Zhang@dot.gov.

Sincerely,

Michael S. Griffith

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:	April 21, 2021	◉ New ○ Resubmission
	Name:	Kevin Harrison	
	Company:	Eastern Metal of Elmira, Inc.	
	Address:	1430 Sullivan Street Elmira, NY 14901	
	Country:	USA	
	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.

Device & Testing Criterion - Enter from right to left starting with Test Level !-!-! !-!-!

System Type	Submission Type	Device Name / Variant	Testing Criterion	Test Level
'WZ': Crash Worthy Work Zon	◉ Physical Crash Testing ○ Engineering Analysis	Apex Dual Recoil Max	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.

Individual or Organization responsible for the product:

Contact Name:	Kevin Harrison	Same as Submitter ☒
Company Name:	Eastern Metal of Elmira, Inc.	Same as Submitter ☒
Address:	1430 Sullivan Street Elmira, NY 14901	Same as Submitter ☒
Country:	USA	Same as Submitter ☒
Enter below all disclosures of financial interests as required by the FHWA `Federal-Aid Reimbursement Eligibility Process for Safety Hardware Devices' document.		
Eastern Metal of Elmira, Inc. and Calspan Corporation share no financial interests between the two organizations. This includes no shared financial interest but not limited to: i. Compensation including wages, salaries, commissions, professional fees, or fees for business referrals iii. Research funding or other forms of research support; iv. Patents, copyrights, licenses, and other intellectual property interests; vi. Business ownership and investment interests;		

PRODUCT DESCRIPTION

(●) New Hardware or Significant Modification ( ) Modification to Existing Hardware

The Apex Dual Recoil Max is a 48" collapsible roll-up sign attached to a dual- spring collapsible sign stand. The sign stand and the roll-up sign can be disassembled and folded-up into a compact package for storage and transport. The attachments were set at a bottom height of 60" from the ground to be fully displayed as would be the installed position. The 48" roll up sign attaches to the sign stand by 2 rigid sign brackets. A foldable flag mechanism is used to display a set of warning flags. The flag mechanism is pivotally attached to the vertical cross-brace member. The combination sign and sign stand assembly can be quickly and readily assembled to its display condition and, correspondingly, disassembled and folded-up to its storage and transport condition.

The leg release system on the sign stands are readily adjustable for varying sign heights and/or uneven terrain. The telescoping legs are made of aluminum and assembled to the steel sign stand base via standard nuts and bolts. The legs have either pull-pins or kick lever releases for quick and efficient releasing from the fold up position. The folded dimensions are 11.5" x 8" x 85.5" and weighs 42 lbs. without the roll-up sign attached. Open dimensions are 57" x 122" x 129.5". Two Sand Bags were added to the base for testing.

CRASH TESTING

By signature below, the Engineer affiliated with the testing laboratory, agrees in support of this submission that all of the critical and relevant crash tests for this device listed above were conducted to meet the MASH test criteria. The Engineer has determined that no other crash tests are necessary to determine the device meets the MASH criteria.

Engineer Name:	Mark Parisi	
Engineer Signature:	Mark J. Parisi — Digitally signed by Mark J. Parisi Date: 2021.04.26 15:38:34 -04'00'	
Address:	4455 Genesee Street, Cheektowaga, NY 14225	Same as Submitter ☐
Country:	USA	Same as Submitter ☐

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
3-70 (1100C)	Designated to evaluate the ability of a small vehicle to activate any breakaway, fracture, or yielding mechanism. Is considered optional for work zone traffic control weighting less than 220 lb (100 kg)	Non-Relevant Test, not conducted

Required Test Number	Narrative Description	Evaluation Results
3-71 (1100C)	For this test, two Apex Dual Recoil Max work zone signs were impacted. The first test article was aligned at 0° and the second test article was aligned at 90° to the impacting vehicle's direction of travel. This test is intended to evaluate the sign stand's behavior when impacted. The primary evaluation is based on intrusion into the occupant compartment, windshield damage, and vehicle stability. Lightweight devices such as this sign stand cannot cause sufficient velocity change that would result in exceeding occupant risk criteria limits. Therefore Test 71 was conducted without instrumentation for evaluating occupant risk values OIV and RA per MASH test description. The test was conducted using a commercially available 2014 Kia Rio with a test inertia mass of 2,445 lbs (1,109 kg). The test vehicle impacted the first sign stand (orientated at 0°) at a velocity of 63.4 mph (102.0 km/hr). Upon impact the roll-up sign released from the sign support and flew over the roof of the vehicle. The sign stand impacted the side of the roof on the vehicle. The test vehicle continued along its path and impacted the second sign stand (oriented at 90°) at a velocity of 60.1 mph (96.7 km/ hr). Upon impact the roll-up sign released from the sign support and continued over the roof of the vehicle, making minimal contact with the windshield. The sign stand impacted the front bumper, but did not make contact with the windshield or roof. The test vehicle's occupant compartment was not penetrated by the test articles and there was NO measurable cab deformation. Debris from the test articles did not block the driver's vision. The vehicle remained upright and did not exceed 75° roll and pitch throughout the test. The vehicle did not leave its lane and its trajectory was stable after both sign stands were impacted. The Impact Points were within the spec of 1/4 offset +/- 6".	

TEST RESULT = PASS

3-72 (2270P)	For this test, two Apex Dual Recoil Max work zone signs were impacted . The first test article was aligned at 0°and the second test article was aligned at 90° to the test vehicle's direction of travel. This test is intended to evaluate the sign stand's behavior when impacted . The primary evaluation is based on intrusion into the occupant compartment, windshield damage, and vehicle stability. Lightweight devices such as this sign stand cannot cause sufficient velocity change that would result in exceeding occupant risk criteria limit s. Therefore Test 72 was conducted without instrumentation for evaluating occupant risk values OIV and RA per MASH test description . The test was conducted using a commercially available 2009 Ram 1500 Pickup Truck with a test inertia mass of 5,022 lbs. (2,278 kg). The test vehicle impacted the first sign stand (orientated at 0°) at a velocity of 63.0 mph (101.4 km/hr). Upon impact the roll-up sign remained on the sign support and continued over the vehicle making minimal contact with the roof. The test vehicle continued along its path and impacted the second sign stand (oriented at 90°) at a velocity of 61.8 mph (99.5 km/ hr). Upon impact the roll-up sign released from the sign support and continued over the top of the vehicle. The sign stand made contact with and dented the roof of the vehicle. The test vehicle's occupant compartment was not penetrated by the test articles, but there was a measurable cab deformation of 0.25in. within the roof, which is below the maximum allowance of 4.0 in. Debris from the test article did not cause a hazard to the driver 's vision. The vehicle remained upright and did not exceed 75° roll and pitch through out the test. The vehicle did not leave its lane and its trajectory was stable after both sign stands were impacted . The Impact Points were within the spec of 1/4 offset +/- 6".	

TESTRESULT = PASS

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:	Calspan Corporation	
Laboratory Signature:	Mark J. Parisi Digitally signed by Mark J. Parisi Date: 2021.04.26 15:43:36 -04'00'	
Address:	4455 Genesee Street Cheektowaga, NY 14225	Same as Submitter ☐
Country:	USA	Same as Submitter ☐
Accreditation Certificate Number and Dates of current Accreditation period :	L20-602 December 31, 2022	

Submitter Signature*: Kevin J Harrison Eastern Metal Signs & Safety Kevin Harrison President/Owner

Submit Form

ATTACHMENTS

Attach to this form:

1) Additional disclosures of related financial interest as indicated above.
2) A copy of the full test report, video, and a Test Data Summary Sheet for each test conducted in support of this request.
3) 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 relevant to understanding the dimensions and performance of the device should also be submitted to facilitate our review.

FHWA Official Business Only:

Eligibility Letter		
Number	Date	Key Words

SECTION 4

MASH TEST 3-71 SUMMARY

Test Article: Eastern Metal Apex Dual Recoil Max

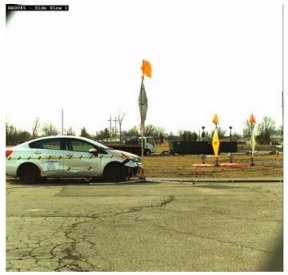
Test Program: MASH 3-71

Project No. BR0045

Test Date: 03/8/2021

SEQUENTIAL PHOTOGRAPHS

0° Orientation Side View 1



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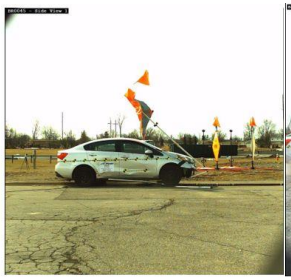

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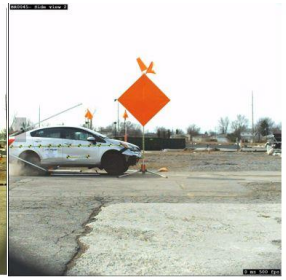
90° Orientation Side view 2



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PLAN VIEW

Vehicle at 62 MPH

Vehicle Stopped

SECTION 4... (CONTINUED)

MASHTEST 3-71SUMMARY

Test Article: Eastern Metal Apex Dual Recoil Max Project No. BR0045

Test Program: MASH 3-71 Test Date: 03/8/2021

SUMMARY TABLE

GENERAL INFORMATION	
TEST AGENCY	Calspan Corporation
TEST NUMBER	Cal BR0045
TEST DESIGNATION	3-71
TEST DATE	3/8/2021

TEST ARTICLE	
NAME / MODEL	Apex Dual Recoil Max
TYPE	Work-Zone Traffic Control Device
KEY ELEMENTS	Sign Stand, Roll up Sign, Metal Base
OVERALL HEIGHT	91 in. (2311.4 mm)
OVERALL WIDTH	80 in. (2032 mm)
BASE WEIGHT	42 lbs. (19.05 kg)
SIGN WEIGHT	< 5 lbs. (2.27 kg)
ROAD SURFACE	Asphalt

TEST VEHICLE	
TYPE / DESIGNATION	1100C
YEAR , MAKE AND MODEL	2014 Kia Rio
CURB MASS	2,526.5 lbs. (1,146 kg)
TEST INERTIAL MASS	2,444.93 lbs. (1,109 kg)
GROSS STATIC MASS	2,444.93 lbs. (1,109 kg)

IMPACT CONDITIONS	
IMPACT VELOCITY(0°)	63.4 mph (102. km/h)
IMPACT VELOCITY (90°)	60.1 mph (96.7 km/h)
IMPACT SEVERITY (0°)	426.14 kJ
IMPACT SEVERITY (90°)	426.14 kJ
IMPACT LOCATION (0 DEG)	472 mm from Centerline to Driver
IMPACT LOCATION (90 DEG)	530 mm from Centerline to Passenger

EXIT CONDITIONS	
EXIT VELOCITY (0°)	63.4 mph (99.8 km/h)
EXIT VELOCITY (90°)	60.1 mph (96.7 km/h)
FINAL RESTING POSITION	180 ft. downstream
VEHICLE STABILITY	Satisfactory
VEHICLE SNAGGING	None
VEHICLE POCKETING	None

OCCUPANT RISK VALUES [1]		
OCCUPANT IMPACT VELOCITY	Longitudinal	N/A
	Lateral	N/A
RIDEDOWN ACCELERATION	Longitudinal	N/A
	Lateral	N/A

TEST ARTICLE **POST-IMPACT**	
ARTICLE DAMAGE	Base Deformation/Upper separation

VEHICLE **DAMAGE**	
VEHICLE DAMAGE SCALE	FL-1 ; FR-2
COLLISION DAMAGE CLASSIFICATION	12FLEN01 ``` 12FREN01
MAXIMUM DEFORMATION	Negligible

[1]Values not calculated due to test article weight being less than 220 lbs. (100 kg)

SECTION 4

MASH TEST 3-72 SUMMARY

Test Article: Eastern Metal Apex Dual Recoil Max

Test Program: MASH 3-72

Project No. BR0057

Test Date: 04/13/2021

SEQUENTIAL PHOTOGRAPHS

0° Orientation Side View 1

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90° Orientation Side View 2

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PLAN VIEW

Vehicle at 62 MPH

Vehicle Stopped

SECTION 4... (CONTINUED)

MASHTEST 3-72 SUMMARY

Test Article: Eastern Metal Apex Dual Recoil Max

Project No. BR0057

Test Program: MASH 3-72

Test Date: 4/13/2021

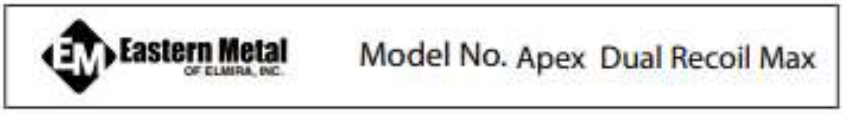
SUMMARY TABLE

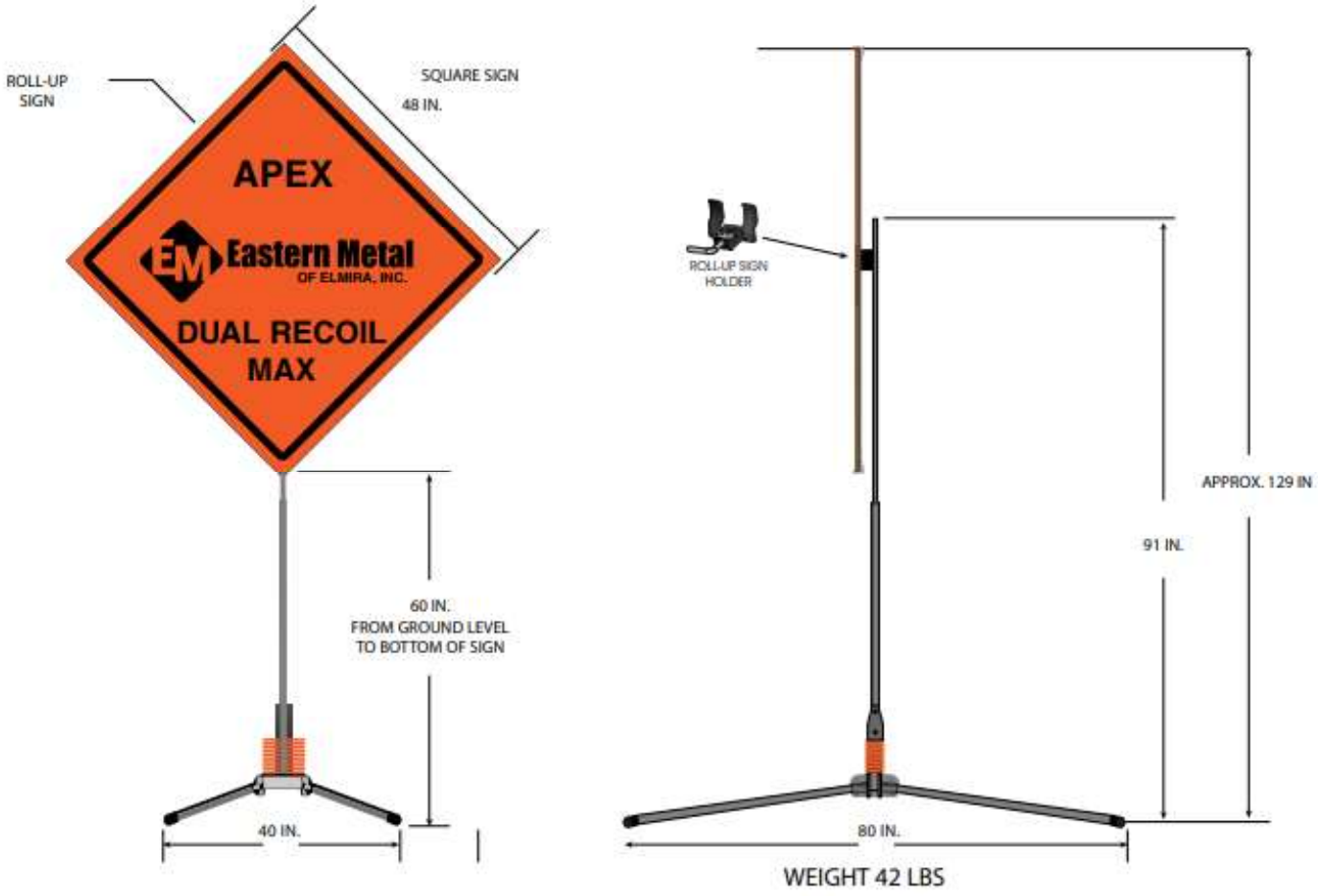
GENERAL INFORMATION	
TEST AGENCY	Calspan Corporation
TEST NUMBER	BR0057
TEST DESIGNATION	3-72
TEST DATE	04/13/2021
TEST ARTICLE	
NAME / MODEL	Apex Dual Recoil Max
TYPE	Work-Zone Traffic Control Device
KEY ELEMENTS	Sign Stand, Roll up Sign, Metal Base.
OVERALL HEIGHT	91 in. (2311.4 mm)
OVERALL WIDTH	80 in. (2032 mm)
BASE WEIGHT	42 lbs. (19.05 kg)
SIGN WEIGHT	< 5 lbs. (2.27 kg)
ROAD SURFACE	Asphalt
TEST VEHICLE	
TYPE / DESIGNATION	2270P
YEAR , MAKE AND MODEL	2009 RAM 1500
CURB MASS	5022.4 lbs. (2278 kg)
TEST INERTIAL MASS	5022.4 lbs. (2278 kg)
GROSS STATIC MASS	5022.4 lbs. (2278 kg)

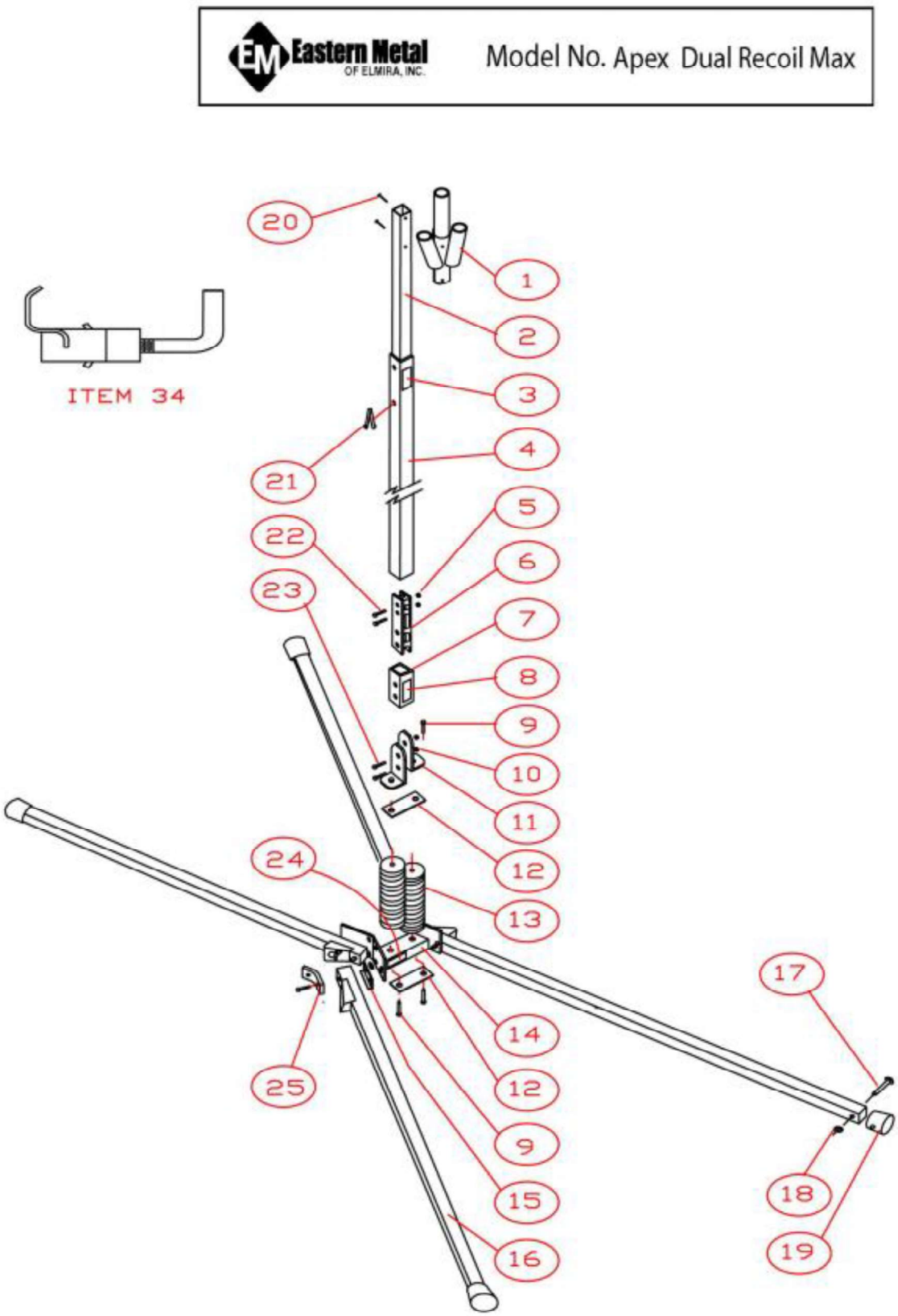
IMPACT CONDITIONS		
IMPACT VELOCITY (0°)		63.0 mph (101.4 km/h)
IMPACT VELOCITY (90°)		61.8 mph (99.5 km/h)
KINETIC ENERGY (0°)		876.22 kJ
KINETIC ENERGY (90°)		876.22 kJ
IMPACT LOCATION (0 DEG)		490 mm from Centerline to Driver
IMPACT LOCATION (90 DEG)		574 mm from Centerline to Passenger
EXIT CONDITIONS		
EXIT VELOCITY (0°)		63.0 mph (101.4 km/h)
EXIT VELOCITY (90°)		61.8 mph (99.5 km/h)
FINAL RESTING POSITION		186 ft. downstream
VEHICLE STABILITY		Satisfactory
VEHICLE SNAGGING		None
VEHICLE POCKETING		None
OCCUPANT RISK VALUES		
OCCUPANT IMPACT VELOCITY	Longitudinal	N/A
	Lateral	N/A
RIDEDOWN ACCELERATION	Longitudinal	N/A
	Lateral	N/A
TEST ARTICLE POST-IMPACT		
ARTICLE DAMAGE		Base Deformation/Upper separation
VEHICLE DAMAGE		
VEHICLE DAMAGE SCALE		FL-1 ; FR-1
COLLISION DAMAGE CLASSIFICATION		12FLEN01 12FREN01
MAXIMUM DEFORMATION		Negligible

[1]Values not calculated due to test article weight being less than 220 lbs. (100 kg)

APPENDIX A – TEST ARTICLE DRAWINGS:






Eastern Metal
OF ELMIRA, INC.
Model No. Apex Dual Recoil Max
ITEM 34
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