U.S. Department of Transportation
Federal Highway Administration

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

November 22, 2016

In Reply Refer To:
HSST-1/ WZ-348

Mr. Mark Rutenbeck
Custom-Pak, Inc.
86 16th Avenue N
Clinton, Iowa 52732

Dear Mr. Rutenbeck:

This letter is in response to your June 1, 2016 request for the Federal Highway Administration (FHWA) to review a roadside safety device, hardware, or system for eligibility for reimbursement under the Federal-aid highway program. This FHWA letter of eligibility is assigned FHWA control number WZ-348 and is valid until a subsequent letter is issued by FHWA that expressly references this device.

Decision

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

- Custom-Pak Vertical Panel With or Without Warning Light

Scope of this Letter

To be found eligible for Federal-aid funding, new 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). However, the FHWA, the Department of Transportation, and the United States Government do not regulate the manufacture of roadside safety devices. Eligibility for reimbursement under the Federal-aid highway program does not establish approval, certification or endorsement of the device for any particular purpose or use.

This letter is not a determination by the FHWA, the Department of Transportation, or the United States Government that a vehicle crash involving the device will result in any particular outcome, nor is it a guarantee of the in-service performance of this device. Proper manufacturing, installation, and maintenance are required in order for this device to function as tested.

This finding of eligibility is limited to the crashworthiness of the system and does not cover other structural features, nor conformity with the Manual on Uniform Traffic Control Devices.

Eligibility for Reimbursement

Based solely on a review of crash test results and certifications submitted by the manufacturer, and the crash test laboratory, FHWA agrees that 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). Therefore, the device is eligible for reimbursement under the Federal-aid highway program if installed under the range of tested conditions.

Name of system:	Custom-Pak Vertical Panel
Type of system:	Work Zone Vertical Panel
Test Level:	MASH Test Level 3 (TL3)
Testing conducted by:	KARCO Inc
Date of request:	June 1, 2016
Date initially acknowledged:	June 15, 2016
Date of completed package:	November 17, 2016

FHWA concurs with the recommendation of the accredited crash testing laboratory as stated within the attached form.

Full Description of the Eligible Device

The device and supporting documentation, including reports of the crash tests or other testing done, videos of any crash testing, and/or drawings of the device, are described in the attached form.

Notice

If a manufacturer makes any modification to any of their roadside safety hardware that has an existing eligibility letter from FHWA, the manufacturer must notify FHWA of such modification with a request for continued eligibility for reimbursement. The notice of all modifications to a device must be accompanied by:

- Significant modifications – For these modifications, crash test results must be submitted with accompanying documentation and videos.
- Non-signification modifications – For these modifications, a statement from the crash test laboratory on the potential effect of the modification on the ability of the device to meet the relevant crash test criteria.

FHWA's determination of continued eligibility for the modified hardware will be based on whether the modified hardware will continue to meet the relevant crash test criteria.

Any user or agency relying on this eligibility letter is expected to use the same designs, specifications, drawings, installation and maintenance instructions as those submitted for review.

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.

Issuance of this letter does not convey property rights of any sort or any exclusive privilege. This letter is based on the premise that information and reports submitted by you are accurate and correct. We reserve the right to modify or revoke this letter if: (1) there are any inaccuracies in the information submitted in support of your request for this letter, (2) the qualification testing was flawed, (3) in-service performance or other information reveals safety problems, (4) the system is significantly different from the version that was crash tested, or (5) any other information indicates that the letter was issued in error or otherwise does not reflect full and complete information about the crashworthiness of the system.

Standard Provisions

- To prevent misunderstanding by others, this letter of eligibility designated as FHWA control number WZ-348 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 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.

- If the subject device is a patented product it may be considered to be proprietary. If proprietary systems are specified by a highway agency for use on Federal-aid projects: (a) they must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that they are essential for synchronization with the existing highway facilities or that no equally suitable alternative exists; or (c) they must be used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes. Our regulations concerning proprietary products are contained in Title 23, Code of Federal Regulations, Section 635.411.

Sincerely yours,

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:	June 1, 2016	◉ New ○ Resubmission
	Name:	Robert L. Ramirez	
	Company:	KARCO Engineering INC	
	Address:	9270 Holly Rd., Adelanto, CA 92301	
	Country:	United States	
	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 1-1-1

System Type	Submission Type	Device Name / Variant	Testing Criterion	Test Level
'WZ': Crash Worthy Work Zone Traffic Control Devices	◉ Physical Crash Testing ○ Engineering Analysis	Vertical Panel	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:	Mark M. Rutenbeck	Same as Submitter ☐
Company Name:	Custom-Pak Incorporated	Same as Submitter ☐
Address:	86 Sixteenth Avenue North, Clinton, IA 52732	Same as Submitter ☐
Country:	United States	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.

Subject: Disclosure of financial interest
KARCO Engineering, LLC is an independent research and testing laboratory having no affiliation with any other entity. The company is solely-owned and operated by Mr. Frank D. Richardson and Ms. Jennifer W. Peng (husband and wife) and was established on September 2, 1994. KARCO is actively involved in data acquisition and compliance/certification testing for a variety of government agencies and equipment manufacturers.
The principals and staff of KARCO Engineering have no past or present financial, contractual or organizational interest in any company or entity directly or indirectly related to the products that KARCO tests. If any financial interest should arise, other than receiving fees for testing, reporting, etc., with respect to any project, the company will provide, in writing, a full and immediate disclosure to the FHWA.

PRODUCT DESCRIPTION

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

The Custom-Pak Vertical Panel is a work-zone traffic control device composed of a vertical panel and a rectangular base. For this test, an Empco-Lite Model 400 warning light was installed on the Vertical Panel. The vertical panel weighs 4.0 lbs (1.8 kg), the base weighs 30.0 lbs (13.6 kg) and the Empco-Lite Model 400 warning light weighs 3.0 lbs (1.4 kg). The assembled Vertical Panel with Empco-Lite Model 400 has a total weight of 37.0 lbs (16.8 kg) and a max height of 4.5 ft. (1.4 m).

The vertical panel is composed of a blend of high-density polyethylene (HDPE) and low density polyethylene (LDPE). The vertical panel has on overall height of 3.8 ft. (1.1 m). The bottom of the panel is 14.7 in. (373 mm) wide by 8.9 in. (226 mm) deep and is tapered at the top to a width of 9.0 in. (229 mm) and a depth of 0.7 in. (18 mm). The panel has a wall thickness of 0.09 in. (2 mm) and a bottom zone wall thickness of 0.12 in. (3 mm).

The rectangular base is composed of recycled rubber and is 1.8 in. (46 mm) thick. The base measured 28.0 in. (711 mm) wide by 20.5 in (521 mm) long. The base has a 12.9 in. (328 mm) by 5.5 in. (140 mm) hole at the center of its width through which the panel is inserted.

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:	Robert L. Ramirez	
Engineer Signature:	Robert L. Ramirez Digitally signed by Robert L. Ramirez DN: cn=Robert L. Ramirez, o=KARCO Engineering, ou, email=rramirez@karco.com, c=US Date: 2016.06.07 14:21:43 -07'00'	
Address:	9270 Holly Rd., Adelanto, CA 92301	Same as Submitter ☒
Country:	United States	Same as Submitter ☒

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
3-70 (1100C)	Test not conducted based on the test article weighing less than 220 lbs (100 kg) per MASH.	Non-Relevant Test, not conducted

Required Test Number	Narrative Description	Evaluation Results
3-71 (1100C)	Test Date 2-15-2016 - KARCO Test #TR-P36039-04-NC Complete Report. MASH Test 3-71 involves a 1100C passenger car impacting the vertical panel at a nominal speed of 62 mph (100 km/h) and a critical impact angle of 0° and 90° with the centerline of the vehicle aligned with the centerline of the vertical panel. This test is primarily intended to evaluate behavior of the vertical panel during high-speed impacts. For this test a 2010 Kia Rio weighing 2,471.2 lbs (1,121.0 kg) impacted two vertical panels spaced 65.5 ft. (20.0 m) apart. The first impacted panel was set at 0° and was impacted at a velocity of 61.33 mph (98.70 km/h). The second panel was set at 90° and was impacted at a velocity of 60.16 mph (96.82 km/h). Upon impact, both the 0° and 90° panels detached from their respective bases and impacted the vehicle's hood. The mounted warning light detached from the panel oriented at 0°. The test vehicle sustained damage to the hood and front bumper as a result of the impacts. The vertical panel passed all evaluation criteria for MASH Test 3-71.	PASS
3-72 (2270P)	Test Date 2-15-2016 - KARCO Test #TR-P36039-08-NC. MASH Test 3-72 involves a 2270P pickup truck impacting the vertical panel at a nominal speed of 62 mph (100 km/h) and a critical impact angle of 0° and 90° with the centerline of the vehicle aligned with the centerline of the vertical panel. This test is primarily intended to evaluate behavior of the vertical panel during high-speed impacts. For this test a 2010 RAM 1500 weighing 5,103.7 lbs (2,315.0 kg) impacted two vertical panels spaced 65.6 ft. (20.0 m) apart. The first impacted panel was set at 0° and was impacted at a velocity of 59.95 mph (96.48 km/h). The second panel was set at 90° and was impacted at a velocity of 59.51 mph (95.77 km/h). Upon impact, both the 0° and 90° panels detached from their respective bases and the panels sustained permanent deformation. The test vehicle sustained damage to the hood as a result of the impacts. The vertical panel passed all evaluation criteria for MASH Test 3-72.	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:	KARCO Engineering, INC	
Laboratory Signature:	Robert L. Ramirez Digitally signed by Robert L. Ramirez DN: cn=Robert L. Ramirez, o=KARCO Engineering, ou, email=rramirez@karco.com, c=US Date: 2016.06.07 14:22:05 -07'00'	
Address:	9270 Holly Rd., Adelanto, CA 92301	Same as Submitter ☒
Country:	United States	Same as Submitter ☒
Accreditation Certificate Number and Dates of current Accreditation period :	TL-371, December 18, 2015 through December 18, 2017	

Submitter Signature*: Robert L. Ramirez Digitally signed by Robert L. Ramirez DN: cn=Robert L. Ramirez, o=KARCO Engineering, ou, email=rramirez@karco.com, c=US Date: 2016.06.07 14:22:24 -07'00'

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

Custom-Pak
DESIGN & BLOWMOLDING

86 - 16th Avenue North ▪ Clinton, IA 52732 ▪ www.custom-pak.com ▪ 563-242-1801

November 17, 2016

Mr. Nicholas A. Artimovich, II
Highway Engineer, Safety Design Team
Office of Safety Technologies, Rm E71-322
Federal Highway Administration
U.S. Department of Transportation
1200 New Jersey Avenue, SE
Washington, DC 20590 USA

Dear Mr. Artimovich,

This letter is to confirm that the four devices tested by Karco Engineering and submitted by Custom-Pak Inc. for FHWA Eligibility Letter numbers;
2016-3943, 28" Delineator, WZ345
2016-3944, 42" Delineator, WZ346
2016-3945, 4800 Delineator, WZ347
2016-3946, Vertical Panel, WZ 348,
were each tested in accordance with the AASHTO Manual for Assessing Safety Hardware and met the MASH evaluation criteria.

We hereby request FHWA Review of these four devices.

If any additional information or fees are due in association with our request, please advise us of the requirements so we can comply.

We thank you for your assistance in obtaining our Eligibility Letters and Numbers.

Sincerely,

Mark Rutenbeck
Vice President, General Manager
Custom-Pak, Inc.
86 16th Avenue N.
Clinton, IA 52732

Tax ID 42-1022942

SECTION 4

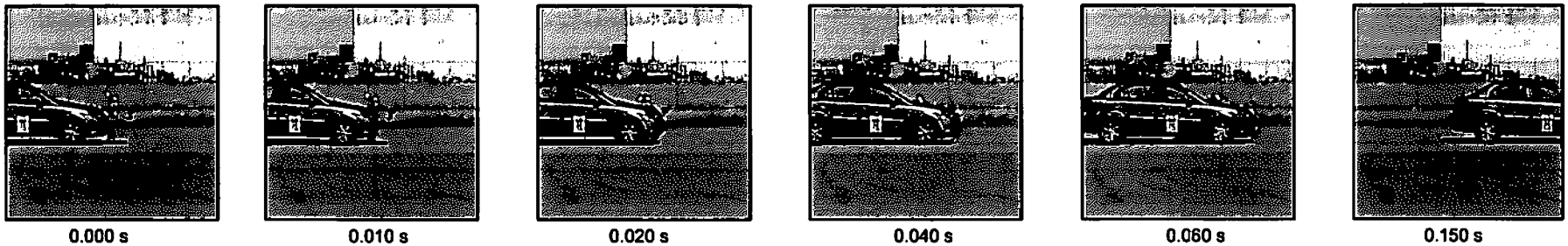
MASH TEST 3-71 SUMMARY

CRITICAL IMPACT ANGLE: 0°

Test Article: Custom-Pak Vertical Panel Project No. P36039-04

Test Program: MASH 3-71 Test Date: 02/15/16

SEQUENTIAL PHOTOGRAPHS



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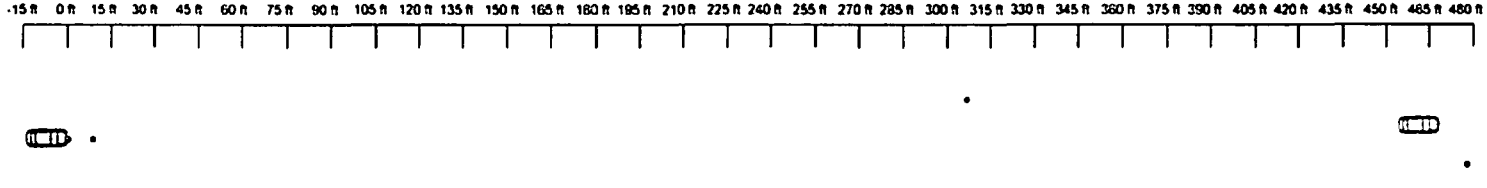
PLAN VIEW



Pre-Test
Article
Vehicle
Post-Test
Article
Vehicle
Debris

SECTION 4... (CONTINUED)

MASH TEST 3-71 SUMMARY

CRITICAL IMPACT ANGLE: 0°

Test Article: Custom-Pak Vertical Panel Project No. P36039-04

Test Program: MASH 3-71 Test Date: 02/15/16

SUMMARY TABLE

GENERAL INFORMATION	
TEST AGENCY	KARCO Engineering, LLC.
TEST NUMBER	P36039-04
TEST DESIGNATION	3-71
TEST DATE	2/15/16
TEST ARTICLE	
NAME / MODEL	Vertical Panel
TYPE	Work-Zone Traffic Control Device
KEY ELEMENTS	Vertical Panel, Base and Warning Light
ARTICLE LENGTH	N/A
TOTAL INSTALLATION LENGTH	N/A
HEIGHT	4.5 ft (1.4 m)
TOTAL WIDTH	N/A
ROAD SURFACE	Asphalt
TEST VEHICLE	
TYPE / DESIGNATION	1100C
YEAR, MAKE AND MODEL	2010 Kia Rio
CURB MASS	2,471.2 lbs (1,121.0 kg)
TEST INERTIAL MASS	2,471.2 lbs (1,121.0 kg)
GROSS STATIC MASS	2,625.6 lbs (1,191.0 kg)

IMPACT CONDITIONS		
IMPACT VELOCITY		61.33 mph (98.70 km/h)
IMPACT ANGLE (°)		0
IMPACT LOCATION / ORIENTATION		Center of panel to centerline of vehicle
EXIT CONDITIONS		
EXIT VELOCITY		[1]
VEHICLE STABILITY		Satisfactory
VEHICLE SNAGGING		None
VEHICLE POCKETING		None
MAXIMUM ROLL ANGLE (°)		[1]
MAXIMUM PITCH ANGLE (°)		[1]
MAXIMUM YAW ANGLE (°)		[1]
KINETIC ENERGY		311.8 kip-ft (422.8 kJ)
OCCUPANT RISK VALUES		
OCCUPANT IMPACT VELOCITY	Longitudinal	[1]
	Lateral	[1]
RIDEDOWN ACCELERATION	Longitudinal	[1]
	Lateral	[1]
THIV		[1]
PHD		[1]
TEST ARTICLE POST-IMPACT		
ARTICLE DAMAGE		Base and warning light separated from panel
VEHICLE DAMAGE		
VEHICLE DAMAGE SCALE		N/A
COLLISION DAMAGE CLASSIFICATION		12FCMN1
MAXIMUM DEFORMATION		N/A

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

SECTION 5

MASH TEST 3-71 SUMMARY

CRITICAL IMPACT ANGLE: 90°

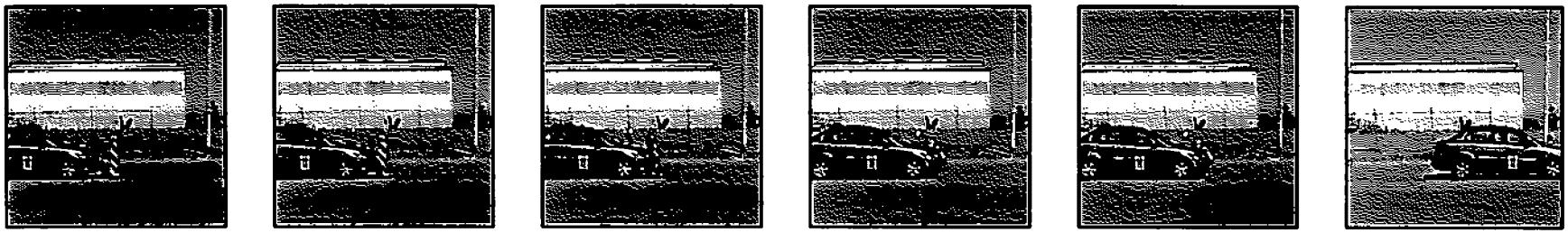
Test Article: Custom-Pak Vertical Panel

Project No. P36039-04

Test Program: MASH 3-71

Test Date: 02/15/16

SEQUENTIAL PHOTOGRAPHS



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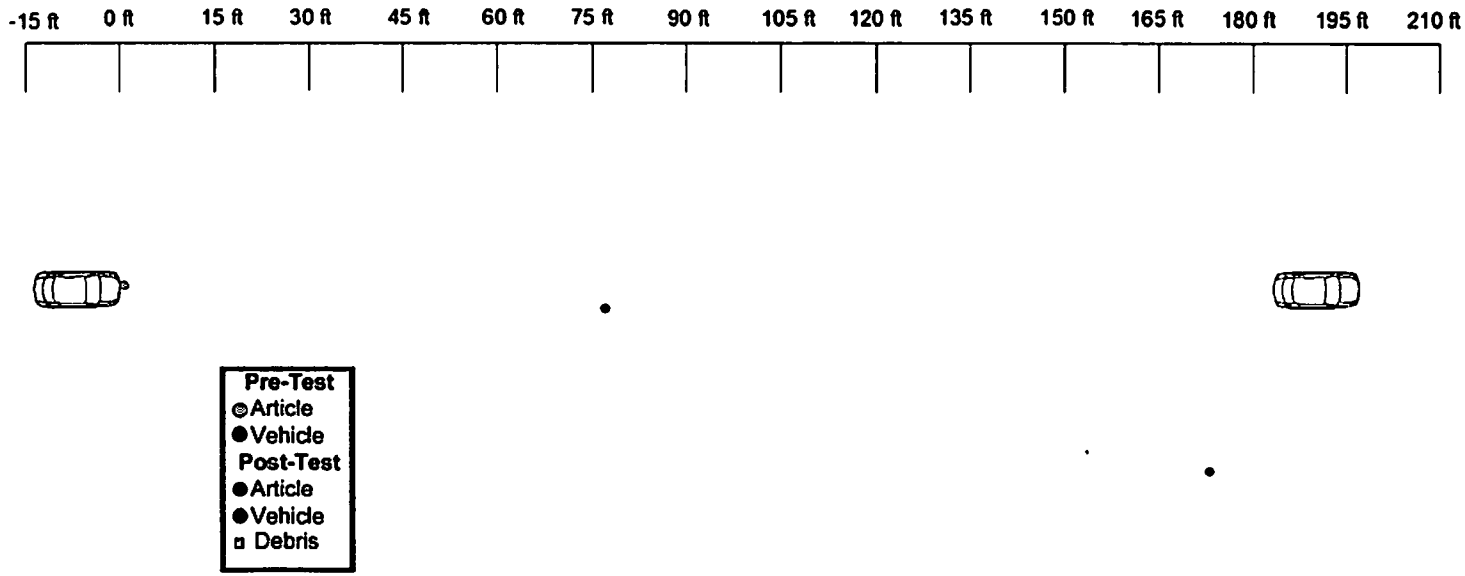
PLAN VIEW



SECTION 5... (CONTINUED)

MASH TEST 3-71 SUMMARY

CRITICAL IMPACT ANGLE: 90°

Test Article: Custom-Pak Vertical Panel — Project No. P36039-04

Test Program: MASH 3-71 — Test Date: 02/15/16

SUMMARY TABLE

GENERAL INFORMATION	
TEST AGENCY	KARCO Engineering, LLC.
TEST NUMBER	P36039-04
TEST DESIGNATION	3-71
TEST DATE	2/15/16
TEST ARTICLE	
NAME / MODEL	Vertical Panel
TYPE	Work-Zone Traffic Control Device
KEY ELEMENTS	Panel, Base and Warning Light
ARTICLE LENGTH	N/A
TOTAL INSTALLATION LENGTH	N/A
HEIGHT	4.5 ft (1.4 m)
TOTAL WIDTH	N/A
ROAD SURFACE	Asphalt
TEST VEHICLE	
TYPE / DESIGNATION	1100C
YEAR, MAKE AND MODEL	2010 Kia Rio
CURB MASS	2,471.2 lbs (1,121.0 kg)
TEST INERTIAL MASS	2,471.2 lbs (1,121.0 kg)
GROSS STATIC MASS	2,625.6.5 lbs (1,191.0 kg)

IMPACT CONDITIONS		
IMPACT VELOCITY		60.16 mph (96.82 km/h)
IMPACT ANGLE (°)		90
IMPACT LOCATION / ORIENTATION		Center of panel to centerline of vehicle
EXIT CONDITIONS		
EXIT VELOCITY		[1]
VEHICLE STABILITY		Satisfactory
VEHICLE SNAGGING		None
VEHICLE POCKETING		None
MAXIMUM ROLL ANGLE (°)		[1]
MAXIMUM PITCH ANGLE (°)		[1]
MAXIMUM YAW ANGLE (°)		[1]
KINETIC ENERGY		300.1 kip-ft (406.9 kJ)
OCCUPANT RISK VALUES		
OCCUPANT IMPACT VELOCITY	Longitudinal	[1]
	Lateral	[1]
RIDEDOWN ACCELERATION	Longitudinal	[1]
	Lateral	[1]
THIV		[1]
PHD		[1]
TEST ARTICLE POST-IMPACT		
ARTICLE DAMAGE		Panel separated from base
VEHICLE DAMAGE		
VEHICLE DAMAGE SCALE		N/A
COLLISION DAMAGE CLASSIFICATION		12FCMN1
MAXIMUM DEFORMATION		N/A

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

SECTION 4

MASH TEST 3-72 SUMMARY

CRITICAL IMPACT ANGLE: 0°

Test Article:	Custom-Pak Vertical Panel	Project No.	P36039-08
Test Program:	MASH 3-72	Test Date:	02/15/16

SEQUENTIAL PHOTOGRAPHS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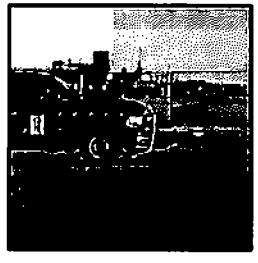
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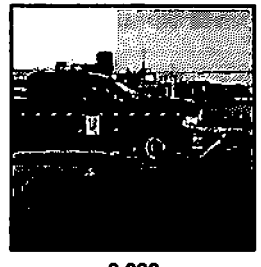
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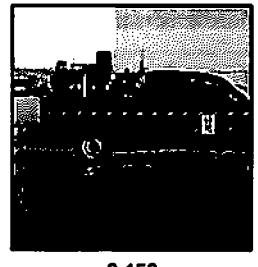
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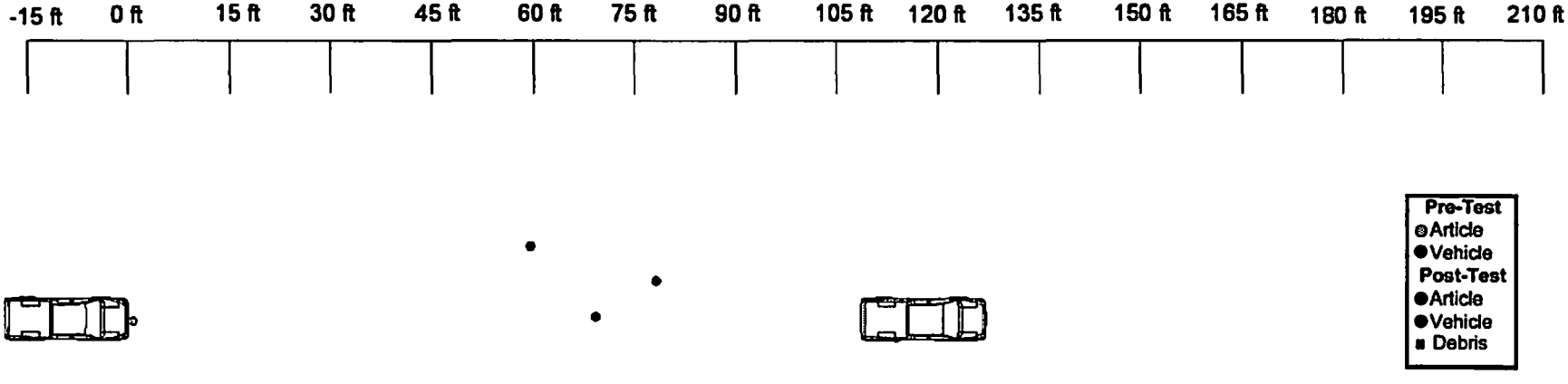
PLAN VIEW



SECTION 4... (CONTINUED)

MASH TEST 3-72 SUMMARY

CRITICAL IMPACT ANGLE: 0°

Test Article: Custom-Pak Vertical Panel Project No. P36039-08

Test Program: MASH 3-72 Test Date: 02/15/16

SUMMARY TABLE

GENERAL INFORMATION	
TEST AGENCY	KARCO Engineering, LLC.
TEST NUMBER	P36039-08
TEST DESIGNATION	3-72
TEST DATE	2/15/16
TEST ARTICLE	
NAME / MODEL	Vertical Panel
TYPE	Work-Zone Traffic Control Device
KEY ELEMENTS	Vertical Panel, Base, Warning Light
ARTICLE LENGTH	N/A
TOTAL INSTALLATION LENGTH	N/A
HEIGHT	4.5 ft (1.4 m)
TOTAL WIDTH	N/A
ROAD SURFACE	Asphalt
TEST VEHICLE	
TYPE / DESIGNATION	2270P
YEAR, MAKE AND MODEL	2010 RAM 1500
CURB MASS	5,017.6 lbs (2,276.0 kg)
TEST INERTIAL MASS	5,103.6 lbs (2,315.0 kg)
GROSS STATIC MASS	5,103.6 lbs (2,315.0 kg)

IMPACT CONDITIONS		
IMPACT VELOCITY		59.95 mph (96.48 km/h)
IMPACT ANGLE (°)		0
IMPACT LOCATION / ORIENTATION		Center of panel to centerline of vehicle
EXIT CONDITIONS		
EXIT VELOCITY		[1]
VEHICLE STABILITY		Satisfactory
VEHICLE SNAGGING		None
VEHICLE POCKETING		None
MAXIMUM ROLL ANGLE (°)		[1]
MAXIMUM PITCH ANGLE (°)		[1]
MAXIMUM YAW ANGLE (°)		[1]
KINETIC ENERGY		613.2 kip-ft (831.4 kJ)
OCCUPANT RISK VALUES		
OCCUPANT IMPACT VELOCITY	Longitudinal	[1]
	Lateral	[1]
RIDEDOWN ACCELERATION	Longitudinal	[1]
	Lateral	[1]
THIV		[1]
PHD		[1]
TEST ARTICLE POST-IMPACT		
ARTICLE DAMAGE		Panel deformation and separation from base
VEHICLE DAMAGE		
VEHICLE DAMAGE SCALE		N/A
COLLISION DAMAGE CLASSIFICATION		12FCMN1
MAXIMUM DEFORMATION		N/A

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

SECTION 5

MASH TEST 3-72 SUMMARY

CRITICAL IMPACT ANGLE: 90°

Test Article: Custom-Pak Vertical Panel Project No. P36039-08

Test Program: MASH 3-72 Test Date: 02/15/16

SEQUENTIAL PHOTOGRAPHS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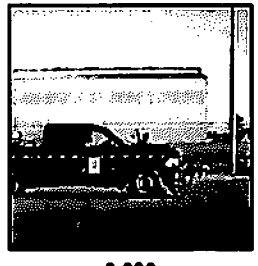
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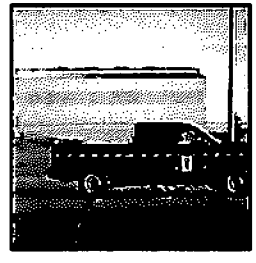
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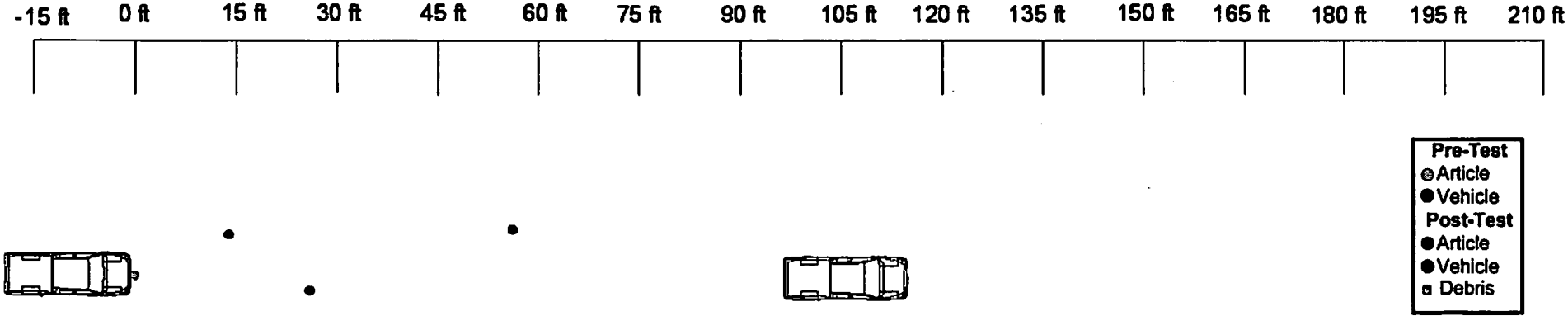
PLAN VIEW



SECTION 5... (CONTINUED)

MASH TEST 3-72 SUMMARY

CRITICAL IMPACT ANGLE: 90°

Test Article: Custom-Pak Vertical Panel Project No. P36039-08

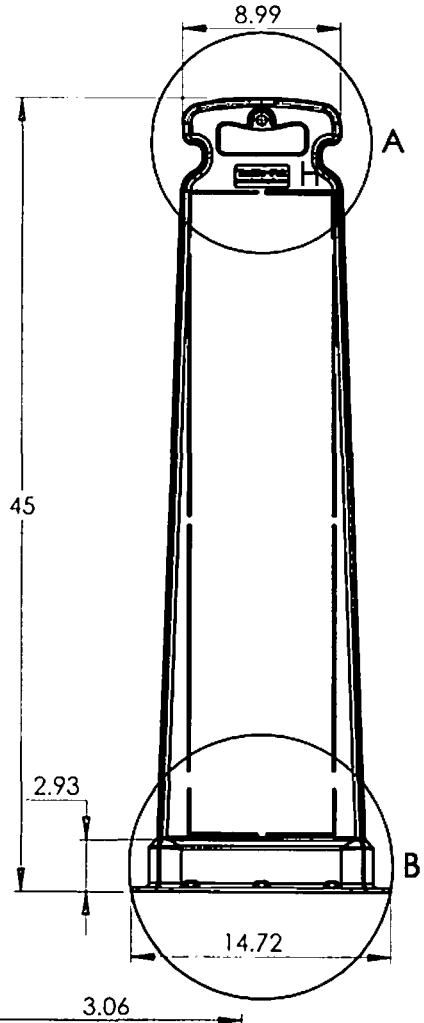
Test Program: MASH 3-72 Test Date: 02/15/16

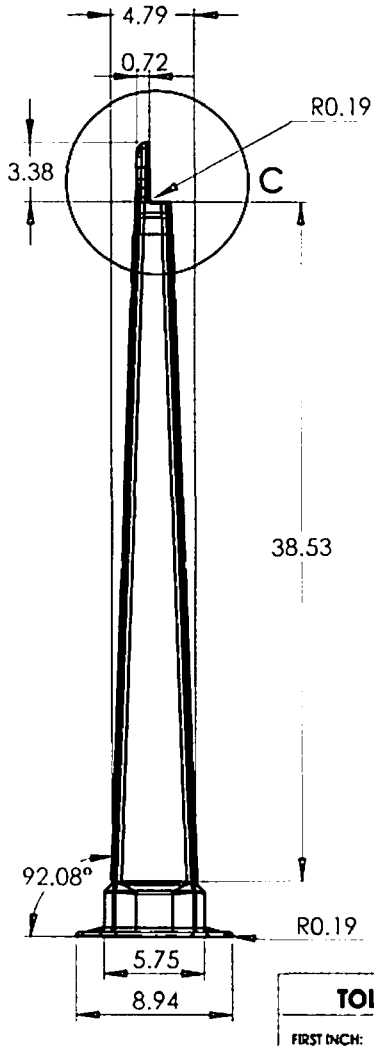
SUMMARY TABLE

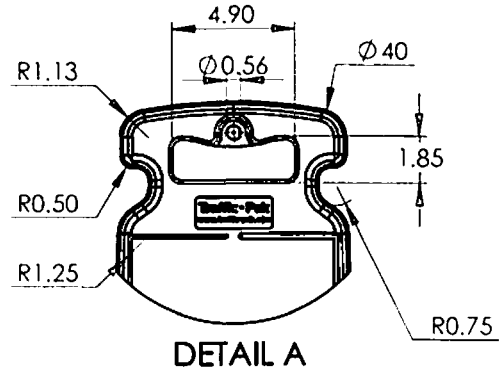
GENERAL INFORMATION	
TEST AGENCY	KARCO Engineering, LLC.
TEST NUMBER	P36039-08
TEST DESIGNATION	3-72
TEST DATE	2/15/16
TEST ARTICLE	
NAME / MODEL	Vertical Panel
TYPE	Work-Zone Traffic Control Device
KEY ELEMENTS	Vertical Panel, Base, Warning Light
ARTICLE LENGTH	N/A
TOTAL INSTALLATION LENGTH	N/A
HEIGHT	4.5 ft (1.4 m)
TOTAL WIDTH	N/A
ROAD SURFACE	Asphalt
TEST VEHICLE	
TYPE / DESIGNATION	2270P
YEAR, MAKE AND MODEL	2010 RAM 1500
CURB MASS	5,017.6 lbs (2,276.0 kg)
TEST INERTIAL MASS	5,103.6 lbs (2,315.0 kg)
GROSS STATIC MASS	5,103.6 lbs (2,315.0 kg)

IMPACT CONDITIONS		
IMPACT VELOCITY		59.51 mph (95.77 km/h)
IMPACT ANGLE (°)		90
IMPACT LOCATION / ORIENTATION		Center of panel to centerline of vehicle
EXIT CONDITIONS		
EXIT VELOCITY		[1]
VEHICLE STABILITY		Satisfactory
VEHICLE SNAGGING		None
VEHICLE POCKETING		None
MAXIMUM ROLL ANGLE (°)		[1]
MAXIMUM PITCH ANGLE (°)		[1]
MAXIMUM YAW ANGLE (°)		[1]
KINETIC ENERGY		604.1 kip-ft (819.1 kJ)
OCCUPANT RISK VALUES		
OCCUPANT IMPACT VELOCITY	Longitudinal	[1]
	Lateral	[1]
RIDEDOWN ACCELERATION	Longitudinal	[1]
	Lateral	[1]
THIV		[1]
PHD		[1]
TEST ARTICLE POST-IMPACT		
ARTICLE DAMAGE		Panel deformation and separation from base
VEHICLE DAMAGE		
VEHICLE DAMAGE SCALE		N/A
COLLISION DAMAGE CLASSIFICATION		12FCMN1
MAXIMUM DEFORMATION		N/A

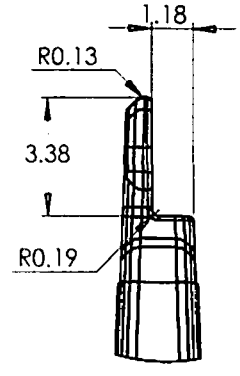
[1] Values not calculated due to test article weight being less than 220 lbs (100 kg)



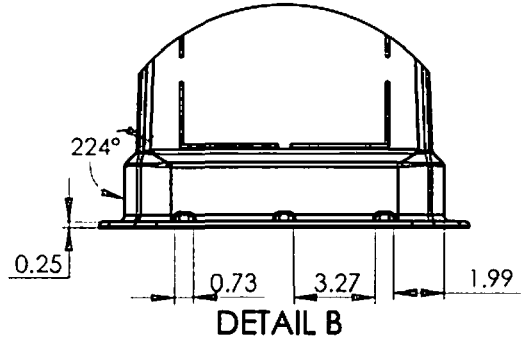




DETAIL A
SCALE 1 : 7

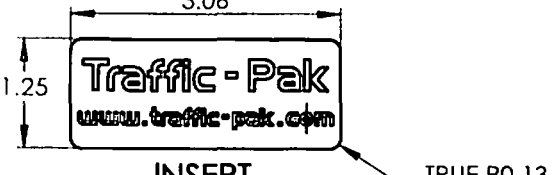


DETAIL C
SCALE 1 : 5



DETAIL B
SCALE 1 : 7

NOTES:
1- Material BLEND HDPE + LDPE
2- Wall thickness must be 0.090".
3- Flash will be less than 0.030"
4- Part must be clean of oil and dust on collars zone.
5- Part should not be bent or twisted.
6- Part must be properly protected during shipment to prevent damage.
7- Wall thickness:
Bottom zone should be 0.120 +/- 0.030
General should be 0.090 +/- 0.030"



INSERT
DETAIL H
SCALE 1 : 2

TOLERANCES		COMMENTS:
FIRST INCH:	+- 0.010	COLOR:
EACH ADDITIONAL INCH UP TO TEN INCHES	+- 0.005	
PER INCH FOR EACH INCH THERE AFT	+- 0.003	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES
PROPIETARY AND CONFIDENTIAL		MATERIAL: BLEND HDPE + LDPE
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF CUSTOM-PAK INC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF CUSTOM-PAK INC. IS PROHIBITED.		FINISHING: NO TEXTURE
		DO NO SCALE DRAWING

TRAFFIC-PAK

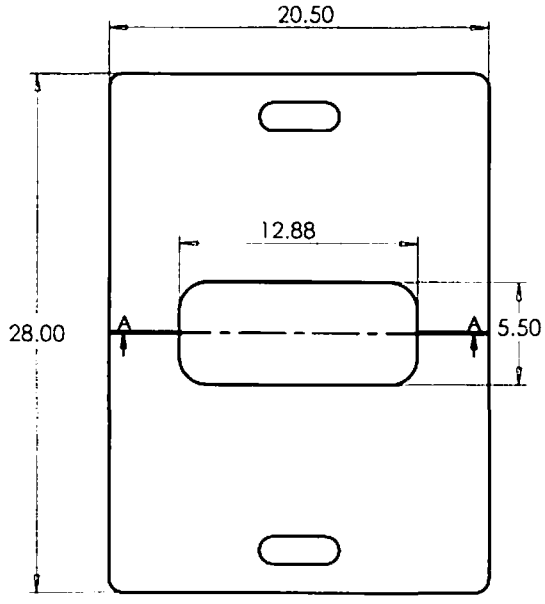
TITLE:

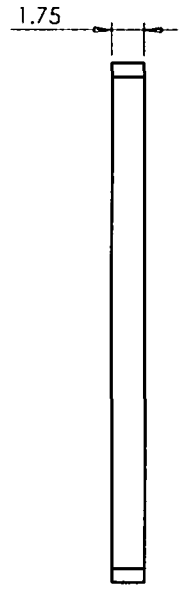
VERTICAL PANEL

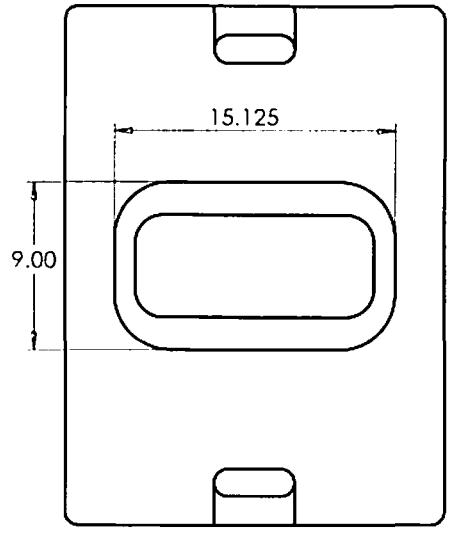
DWG NO. 93009-001

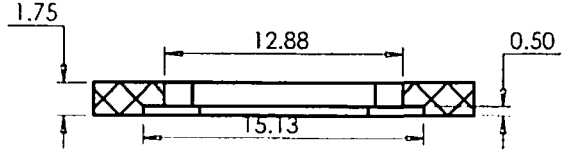
REV 1

WEIGHT: 4.07 LB | SCALE:1:10 | DATE: 26-JAN-2016 | SHEET 1 OF 1









SECTION A-A

TOLERANCES	
FIRST INCH	+- 0.010
EACH ADDITIONAL INCH UP TO TEN INCHES	+- 0.005
PER INCH FOR EACH INCH THERE AFTER	+- 0.003

COMMENTS:
Rubber base provide by SDI

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±
ANGULAR: MACH ± BEND ±
TWO PLACE DECIMAL ±
THREE PLACE DECIMAL ±

MATERIAL
recycled Tire Rubber
FINISH
NO TEXTURE
DO NOT SCALE DRAWING

TRAFFIC-PAK

TITLE:
VP_ Rubber Base
VP Rubber base 30 pounds

SIZE	DWG. NO.	REV
A	MC1497	1
SCALE: 1:10	WEIGHT: 30 Lb	SHEET 1 OF 1