



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

November 3, 2022

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

In Reply Refer To:
HSST-1/WZ-441

Greg Spear
The Cortina Companies, Cortina Safety Products
10706 West Grand Ave,
Franklin Park, IL 60131
United States of America

Dear Mr. Spear:

We received your correspondence of November 12, 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-441.

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: Cortina QuadraFlex VI Economy Tri-Pod Sign Stand with 48" X 48"
Roll-Up Sign
Type of system: Work Zone
Test Level: Test Level 3
Testing conducted by: Appplus IDIADA KARCO Engineering, LLC
Date of request: November 12, 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-441 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-441. 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,

A handwritten signature in black ink that reads "Michael S. Griffith". The signature is written in a cursive style with a large, stylized "M" and "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:	November 12, 2021	<input checked="" type="radio"/> New <input type="radio"/> Resubmission
	Name:	Greg Spear	
	Company:	The Cortina Companies, Cortina Safety Products	
	Address:	10706 West Grand Ave. Franklin Park, IL 60131	
	Country:	United States of America	
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 Zone Traffic Control Devices	<input checked="" type="radio"/> Physical Crash Testing <input type="radio"/> Engineering Analysis	Cortina QuadraFlex VI Economy Tri-Pod Sign Stand with 48" x 48" Roll-Up Sign	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:	Greg Spear	Same as Submitter <input checked="" type="checkbox"/>
Company Name:	The Cortina Companies, Cortina Safety Products	Same as Submitter <input checked="" type="checkbox"/>
Address:	10706 West Grand Ave. Franklin Park, IL 60131	Same as Submitter <input checked="" type="checkbox"/>
Country:	United States of America	Same as Submitter <input checked="" type="checkbox"/>

Enter below all disclosures of financial interests as required by the FHWA 'Federal-Aid Reimbursement Eligibility Process for Safety Hardware Devices' document.

The Cortina Companies, Cortina Safety Products is the manufacturer and marketer of device.

Applus IDIADA KARCO Engineering, LLC (IDIADA KARCO) is an independent research and testing laboratory having no affiliation with any other entity. IDIADA 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 IDIADA KARCO 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

Product Description of QuadraFlex VI Economy Tri-Pod Sign Stand with 48" x 48" Roll-Up Sign
(Reference Drawing 07-822-1 Economy Tri-Pod, Standard Roll-Up Sign)

The QuadraFlex VI Economy Tri-Pod Sign Stand is a work-zone traffic control device used to display traffic control signs.

Further Description:

The Cortina Companies QuadraFlex VI Economy Tri-Pod Sign Stand with 48" x 48" Roll-Up Sign is a work-zone traffic control device. For this test, a 48" x 48" roll-up sign was installed on the sign stand. The as-tested device consisted of a base assembly, and 48" x 48" roll-up sign. The assembled device had a total mass of 8 lbs. (3.63 kg) and total height of 79 in. (2.01 m) from the ground. For this test, one (1) 30 lbs (13.6 kg) sandbag was used. The base assembly consists of, three (3) 1" steel tube legs, one (1) plate, one (1) anchor, and four (4) catch brackets. The two (2) front legs are 60.23 in. (1.53 m) long with two (2) catch brackets on each leg to allow the sign to rest on it. The one (1) rear leg is 61.51 in. (1.56 m) long. The three (3) legs of the Economy Tri-Pod are secured together by an anchor and plate. For this test, the two (2) front legs of the tripod were placed on the ground 62.32 in. apart (1.58 m) and at an angle of 60 degrees. The rear leg was placed 42.98 in. (1.09 m) apart from the front two (2) legs and at an angle of 45 degrees.

The QuadraFlex VI Economy Tri-Pod Sign Stand was tested with a 48" x 48" roll-up sign for this test. The roll-up sign is made up of the flexible substrate sign mounted to two (2) fiberglass cross brace ribs measuring 1.25 in. wide by 65.0 in. long each.

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:	Noah Partida	
Engineer Signature:	Noah Partida	Digitally signed by Noah Partida DN: cn=Noah Partida, o, ou, email=noah.partida@idiada.com, c=US Date: 2022.06.01 15:56:28 -07'00'
Address:	9270 Holly Road, Adelanto, CA 92301	Same as Submitter <input type="checkbox"/>
Country:	United States of America	Same as Submitter <input checked="" type="checkbox"/>

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
3-70 (1100C)	Designed to evaluate the ability of a small vehicle to activate any breakaway, fracture, or yielding mechanism. Is considered optional for work-zone traffic control devices weighing less than 220 lbs (100 kg). The as-tested device weighed 10 lbs (5 kg) and therefore Test 70 was not performed.	Non-Relevant Test, not conducted

Required Test Number	Narrative Description	Evaluation Results
3-71 (1100C)	<p>An 1100C test vehicle approached the test article at a nominal speed of 62 mph (100 km/h). The QuadraFlex VI Economy Tri-Pod Sign Stand impact was oriented at 90° and 0°. The test vehicle impacted the 90° CIA device at a speed of 62.96 mph (101.33 km/h). The vehicle's front bumper first made contact with the lower mast's front left leg. Upon impact, the roll-up sign and the leg deformed around the vehicles's front bumper. As the vehicle proceeded forward, the upper and lower masts separated and overpassed the vehicle. The occupant compartment was not penetrated and the MASH deformation limits were not exceeded. The test vehicle impacted the 0° CIA device at a velocity of 61.55 mph (99.05 km/h). The vehicle's front bumper made contact with the lower masts front legs and the roll-up sign. The legs deformed around the vehicle's front end and remained intact. As the vehicle proceeded forward, the upper and lower masts separated and then overpassed the vehicle. The occupant compartment was not penetrated and the MASH deformation limits were not exceeded. The QuadraFlex VI Tri-Pod Sign Stand met all the requirements for MASH Test 3-71.</p>	PASS

3-72 (2270P)	<p>A 2270P test vehicle approached the test article at a nominal speed of 62 mph (100 km/h). The QuadraFlex VI Economy Tri-Pod Sign Stand impact was oriented at 90° and 0°. The test vehicle impacted the 90° CIA device at a velocity of 65.54 mph (105.48 km/h). The vehicle's front bumper first made contact with the upper mast's roll-up sign and the lower mast's front left leg. Upon impact, the lower and upper masts wrapped around the front of the vehicle. As the vehicle proceeded forward, the upper and lower masts separated and then overpassed the vehicle. The occupant compartment was not penetrated and the MASH deformation limits were not exceeded. The test vehicle impacted the 0° CIA device at a velocity of 63.97 mph (102.95 km/h). The vehicle's front bumper first made contact with upper mast's roll-up sign and the lower mast's front left leg. Upon impact, the device deformed around the vehicle's front end and broke apart. The occupant compartment was not penetrated and the MASH deformation limits were not exceeded. The QuadraFlex VI Economy Tri-Pod Sign Stand met all the requirements for MASH Test 3-72.</p>	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:	Applus IDIADA KARCO Engineering, LLC.	
Laboratory Signature:	Noah Partida  <small>Digitally signed by Noah Partida DN: cn=Noah Partida, o, ou, email=noah.partida@idiada.com, c=US Date: 2022.06.01 15:56:07 -07'00'</small>	
Address:	9270 Holly Road, Adelanto, CA 92301	Same as Submitter <input type="checkbox"/>
Country:	United States of America	Same as Submitter <input checked="" type="checkbox"/>
Accreditation Certificate Number and Dates of current Accreditation period :	TL 371: July 1, 2019 - July 1, 2022	

Submitter Signature*: **Greg Spear**

Digitally signed by Greg Spear
Date: 2022.06.02 07:35:28 -05'00'

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

MASH 2016 Test 3-71 Summary

90° CIA

0° CIA



0.000 seconds

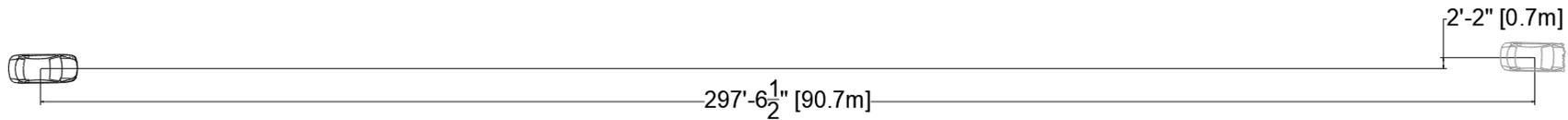
0.100 seconds

0.200 seconds

0.600 seconds

0.700 seconds

0.800 seconds



GENERAL INFORMATION

Test Agency..... Applus IDIADA KARCO
 Test Number..... P40339-01
 Test Designation..... MASH 3-71
 Test Date..... 3/30/21

TEST ARTICLE

Name / Model..... Quadraflex VI Economy Tri-Pod Sign Stand
 with 48" x 48" Roll-Up Sign
 Type..... Work-Zone Device
 Device Height 5.1 ft. (1.6 m)
 Key Elements..... Leg Assembly, Roll-Up Sign
 Road Surface..... Smooth, clean concrete

TEST VEHICLE

Type / Designation..... 1100C
 Year, Make, and Model..... 2015 Kia Rio
 Curb Mass..... 2,528.7 lbs (1,147.0 kg)
 Test Inertial Mass..... 2,449.3 lbs (1,111.0 kg)
 Gross Static Mass..... 2,622.4 lbs (1,189.5 kg)

Impact Conditions

Impact Velocity Device 1..... 62.96 mph (101.33 km/h)
 Impact Velocity Device 2..... 61.55 mph (99.05 km/h)
 Device 1 Location / Orientation..... 19.0 in. (483 mm) From Vehicle
 Centerline on Passenger Side
 Device 2 Location / Orientation..... 13.7 in. (349 mm) From Vehicle
 Centerline on Driver Side

Device 1 Angle..... 90.0°
 Device 2 Angle..... 0.0°
 Device 1 Kinetic Energy..... 324.6 kip-feet (440.1 Kilojoules)
 Device 2 Kinetic Energy..... 310.1 kip-feet (420.5 Kilojoules)
 Minimum KE Required..... 288 kip-feet (390 Kilojoules)

Exit Conditions

Device 1 Exit Velocity..... 62.40 mph (100.4 km/h)
 Device 2 Exit Velocity..... 60.74 mph (97.8 km/h)
 Vehicle Resting Position..... 297.7 ft. (90.7 m) Downstream
 2.2 ft. (0.7 m) Left
 90° - Vehicle Stability Satisfactory
 0° - Vehicle Stability Satisfactory
 90° - Maximum Roll Angle..... Did Not Exceed 75°
 90° - Maximum Pitch Angle..... Did Not Exceed 75°
 0° - Maximum Roll Angle..... Did Not Exceed 75°
 0° - Maximum Pitch Angle..... Did Not Exceed 75°

Occupant Risk

Longitudinal OIV..... Not Applicable*
 Lateral OIV..... Not Applicable*
 Longitudinal RA..... Not Applicable*
 Lateral RA..... Not Applicable*
 THIV..... Not Applicable*
 PHD..... Not Applicable*
 ASI..... Not Applicable*

Test Article Deflections

90° - Device Debris Field (longitudinal).. 74.0 ft. (22.6 m)
 90° - Device Debris Field (lateral)..... 31.7 ft. (9.6 m)
 0° - Device Debris Field (longitudinal) 156.5 ft. (47.7 m)
 0° - Sign Debris Field (lateral)... 9.7 ft. (3.0 m)

Vehicle Damage

Vehicle Damage Scale..... 12-FD-1
 CDC..... 12FDAW1
 90° - Maximum Deformation..... MASH Deformation Limits Not
 Exceeded 0.0 in. (0 mm)
 0° - Maximum Deformation..... MASH Deformation Limits Not
 Exceeded 0.0 in. (0 mm)

* Not Applicable, device weighs less than 220 lbs (100 kg)

Figure 2 Summary of Test 3-71

MASH 2016 Test 3-72 Summary

90° CIA

0° CIA



0.000 seconds

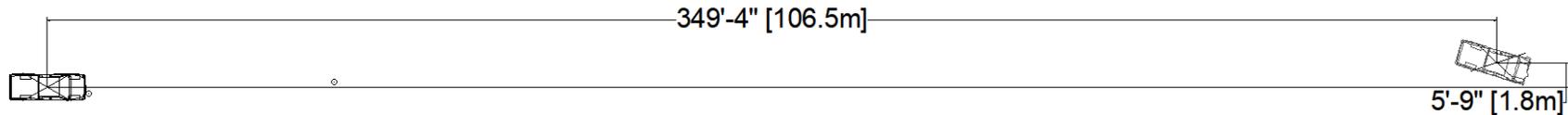
0.060 seconds

0.120 seconds

0.630 seconds

0.690 seconds

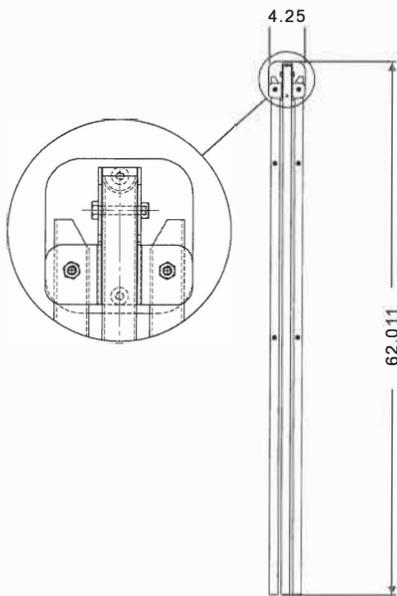
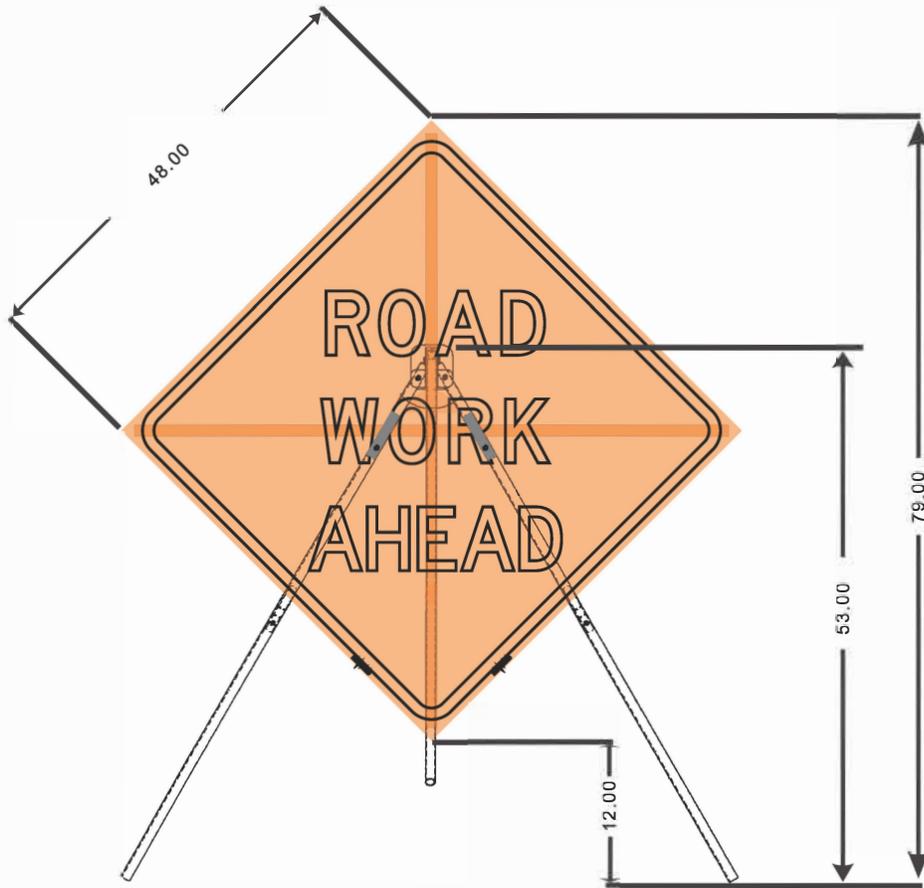
0.750 seconds



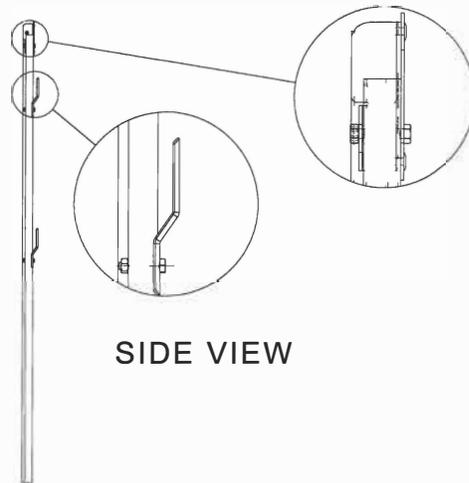
General Information	Impact Conditions	Occupant Risk
Test Agency..... Applus IDIADA KARCO Test Number..... P40340-01 Test Designation..... MASH 3-72 Test Date..... 4/6/21	Impact Velocity Device 1..... 65.54 mph (105.48 km/h) Impact Velocity Device 2..... 63.97 mph (102.95 km/h) Device 1 Location / Orientation..... 23.2 in. (591 mm) From Vehicle Centerline on Passenger Side Device 2 Location / Orientation..... 20.5 in. (521 mm) From Vehicle Centerline on Driver Side Device 1 Angle..... 90.0° Device 2 Angle..... 0.0° Device 1 Kinetic Energy..... 719.4 kip-feet (975.5 Kilojoules) Device 2 Kinetic Energy..... 685.4 kip-feet (929.2 kilojoules) Minimum Required KE..... 594.0 kip-feet (806.0 Kilojoules)	Longitudinal OIV..... Not Applicable* Lateral OIV..... Not Applicable* Longitudinal RA..... Not Applicable* Lateral RA..... Not Applicable* THIV..... Not Applicable* PHD..... Not Applicable* ASI..... Not Applicable*
Test Article Name / Model..... QuadraFlex VI Economy Tri-Pod Sign Stand with 48" x 48" Roll-Up Sign Type..... Work-Zone Traffic Device Device Height..... 6.6 ft. (2 m) Key Elements..... Leg Assembly, Roll-Up Sign Road Surface..... Smooth, clean concrete	Exit Conditions Device 1 Exit Velocity..... 65.08 mph (104.7 km/h) Device 2 Exit Velocity..... 63.75 mph (102.6 km/h) Vehicle Resting Position..... 349.3 ft. (106.5 m) Downstream 5.8 ft. (1.8 m) Left 90° - Vehicle Stability..... Satisfactory 0° - Vehicle Stability..... Satisfactory 90° - Maximum Roll Angle..... Did Not Exceed 75° 90° - Maximum Pitch Angle..... Did Not Exceed 75° 0° - Maximum Roll Angle..... Did Not Exceed 75° 0° - Maximum Pitch Angle..... Did Not Exceed 75°	Test Article Deflections 90° Sign Debris Field (longitudinal).. 92.4 ft. (28.2 m) 90° Sign Debris Field (lateral)..... 39.9 ft. (12.1 m) 0° Sign Debris Field (longitudinal).... 161.2 ft. (49.1 m) 0° Sign Debris Field (lateral)..... 14.8 ft. (4.5 m)
Test Vehicle Type / Designation..... 2270P Year, Make, and Model..... 2015 Ram 1500 Curb Mass..... 5,044.1 lbs (2,2880.0 kg) Test Inertial Mass..... 5,009.9 lbs (2,272.5 kg) Gross Static Mass..... 5,009.9 lbs (2,272.5 kg)		Vehicle Damage Vehicle Damage Scale..... 12-FD-1 CDC..... 12FDAW1 90° - Maximum Deformation..... MASH Deformation Limits Not Exceeded (0.0 in.) 0 mm 0° - Maximum Deformation..... MASH Deformation Limits Not Exceeded (0.0 in.) 0 mm

Figure 2 Summary of Test 3-72

CORTINA SAFETY PRODUCTS QUADRAFLEX VI ECONOMY TRI-POD SIGN STAND

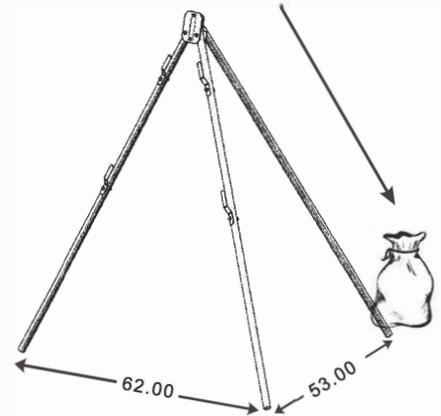


STORAGE DIMENSIONS



WEIGHT 10 LB

OPTIONAL SAND BAGS
MAY BE USED



OPEN FOOTPRINT