



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

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

September 6, 2017

In Reply Refer To:  
HSST-1/ WZ-352

Henry A. Ross, Director  
Government Relations  
Plasticade  
7700 N. Austin Avenue  
Skokie, IL 60077

Dear Mr. Ross:

This letter is in response to your April 7, 2017 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-352 and is valid until a subsequent letter is issued by FHWA that expressly references this device.

### **Decision**

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

- Plasticade SS310 Sign Stand System with Industry Standard 48"x48" Rollup Sign

### **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' (AASHTO) 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: Plasticade SS310 Sign Stand System with Industry Standard 48"x48"  
Rollup Sign

Type of system: Work Zone Traffic Control Devices

Test Level: MASH Test Level 3

Testing conducted by: E-Tech

Date of request: April 7, 2017

Date of completed package: June 7, 2017

FHWA concurs with recommendation of the accredited crash testing laboratory as stated within the attached form on determination of eligibility for the sign substrate that was physically tested (Industry Standard 48"x48" Rollup Sign). This determination of eligibility does not apply to other sign substrates not physically tested, but recommended by the laboratory. If an eligibility letter is requested on these other sign substrates, this will require successful physical crash testing as per 2016 AASHTO MASH.

### **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**

This eligibility letter is issued for the subject device as tested. Modifications made to the device are not covered by this letter and will need to be tested in accordance with all recommended tests in AASHTO's MASH as part of a new and separate submittal.

You are expected to supply potential users with sufficient information on design, installation and maintenance 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 AASHTO's 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-352 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,

A handwritten signature in blue ink, appearing to read "Robert Ritter", with the initials "(for)" written in parentheses below the signature.

Robert Ritter  
Acting Director, Office of Safety  
Technologies  
Office of Safety

Enclosures

## Request for Federal Aid Reimbursement Eligibility of Highway Safety Hardware

<b>Submitter</b>	Date of Request:	April 05, 2017	<input checked="" type="radio"/> New <input type="radio"/> Resubmission
	Name:	Henry A. Ross	
	Company:	Plasticade	
	Address:	7700 N. Austin Avenue, Skokie, IL 60077	
	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 Zone Traffic Control Devices	<input checked="" type="radio"/> Physical Crash Testing <input type="radio"/> Engineering Analysis	Plasticade SS310 Sign Stand System	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:	Henry A. Ross	Same as Submitter <input checked="" type="checkbox"/>
Company Name:	Plasticade	Same as Submitter <input checked="" type="checkbox"/>
Address:	7700 N. Austin Avenue, Skokie, IL 60077	Same as Submitter <input checked="" type="checkbox"/>
Country:	USA	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 Plasticade SS310 Sign Stand System is the commercial embodiment of intellectual property that is not protected by patents. Plasticade does not pay royalties for sales of the Plasticade SS310 Sign Stand System. The Plasticade SS310 Sign Stand System was designed and developed by engineers at Plasticade. Plasticade sponsored certain crash tests of the Plasticade SS310 Sign Stand System; such tests were conducted by E-Tech Testing Services, an independent, wholly-owned subsidiary of Trinity Highway. E-Tech Testing Services is an International Standards Organization (ISO) 17025 accredited laboratory with American Association for Laboratory Accreditation (A2LA) Mechanical Testing certificate 989.01. Full-scale crash testing on the Plasticade SS310 Sign Stand System was performed in accordance with testing criteria, as set forth by the Manual for Assessing Safety Hardware (MASH), 2009.

## PRODUCT DESCRIPTION

- New Hardware or Significant Modification    
  Modification to Existing Hardware

Plasticade's SS310 Sign Stand System is a work zone traffic control device designed to regulate, warn, and advise road users to traverse a section of highway or street in the proper manner. The sign stand consists of a base frame with an upright spring and four extendable steel legs and components to secure an industry standard 1.22 m x 1.22 m or smaller rollup fabric sign. The rollup fabric signs were attached to the stand using the integrated clamping mechanism. The as tested mounting height of the sign measures 0.36 m above grade. The legs were extended for testing. The SS310 stand weighs 10.0 kg, excluding the 2.3 kg rollup sign. The same sign stand is also available with aluminum legs (SS310A). The request is for both sign stands (SS310/SS310A).

### 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:	Paul Kruse	
Engineer Signature:	<b>Paul Kruse</b>	Digitally signed by Paul Kruse DN: cn=Paul Kruse, o=Trinity Highway, ou=E-TECH Testing Services, email=paul.kruse@etechtesting.com, c=US Date: 2017.04.06 13:18:32 -07'00' Adobe Acrobat DC version: 2015.023.20070
Address:	3617B Cincinnati Ave, Rocklin, CA 95765	Same as Submitter <input type="checkbox"/>
Country:	United States	Same as Submitter <input type="checkbox"/>

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
3-70 (1100C)		Non-Critical, not conducted

Required Test Number	Narrative Description	Evaluation Results
3-71 (1100C)	<p>Test of Plasticade SS310 Sign Stand device with a MASH specified 1100C test vehicle. The test was run on 12/15/15. The curb mass of the vehicle was 1108.5 kg and the final test inertial mass was 1112.0 kg. Impact speeds were 99.8 km/h and 98.9 km/h for the 0 and 90 degree sign stands, respectively. For the 0 degree test, the 1100C vehicle's front bumper impacted the vertical member of the sign stand just above the spring. The spring immediately fractured releasing the sign from the stand. The sign laid on the hood with the vertical fiberglass support contacting the bottom of the windshield causing minor damage. The lower leg section of the stand stayed low during the impact and slid forward. For the 90 degree test, the 1100C vehicle's front bumper impacted the vertical member of the sign stand just above the spring. As the stand began to yield, the sign released from the stand. The sign stand laid down flat and the vehicle passed over the entire sign stand. The test vehicle sustained negligible damage to the bumper, hood, or roof; there was no damage to the undercarriage of the test vehicle. There was no damage to the windshield. There was no penetration or deformation of the occupant compartment.</p>	PASS

3-72 (2270P)	<p>Test of the Plasticade SS310 Sign Stand device with a MASH specified 2270P test vehicle. The test was run on 11/14/16. The curb mass of the vehicle was 2192.0 kg and the final test inertial mass was 2272.0 kg. Impact speeds were 99.8 km/h and 97.8 km/h for the 0 and 90 degree sign stands, respectively.</p> <p>For the 0 degree test, the 2270P vehicle's front bumper impacted the vertical member of the sign stand just above the spring. As the upright yielded, the rollup sign released from the stand and draped over the upper grille and hood areas. The sign remained in this position until the vehicle stopped. As the stand started to pass under the vehicle, the vertical member with the spring detached and remained under the vehicle. The vehicle passed over the remaining section of the stand and it moved forward.</p> <p>For the 90 degree test, the 2270P vehicle's hood and bumper impacted the bottom of the sign and the vertical member of the sign stand just above the spring. The sign immediately released from the vertical member of the stand and draped over the bumper and hood. The vehicle passed over the stand; one of the legs bounced up and lodged on the inside of the passenger frame rail. The test vehicle sustained minor damage to the front bumper and hood; there was no damage to the undercarriage of the test vehicle. There was no damage to the windshield. There was no penetration or deformation of the occupant compartment. The Plasticade SS310 was judged by E-TECH to have successfully met MASH evaluation criteria for Test Level 3 under the criteria for work zone traffic control devices.</p>	PASS
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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:	E-Tech Testing Services, Inc.	
Laboratory Signature:	<b>Paul Kruse</b> <small>Digitally signed by Paul Kruse  DN: cn=Paul Kruse, o=Tersty Highway, ou=E-TECH Testing Services,  email=paul.kruse@estechtesting.com, c=US  Date: 2017.04.06 13:18:16 -0700  Adobe Acrobat DC version: 2015.023.26070</small>	
Address:	3617B Cincinnati Ave, Rocklin, CA 95765	Same as Submitter <input type="checkbox"/>
Country:	United States	Same as Submitter <input type="checkbox"/>
Accreditation Certificate Number and Dates of current Accreditation period :	A2LA Certificate #989.01, November 20, 2015 thru November 30, 2017	

Submitter Signature\*: **Henry A. Ross**  
Digitally signed by Henry A. Ross  
DN: cn=Henry A. Ross, o=Plasticade, ou,  
email=hross@plasticade.com, c=US  
Date: 2017.04.06 15:32:38 -0500

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





**Normal (0 deg) Orientation**



t = 0.000 sec



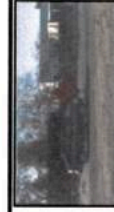
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t = 0.071 sec



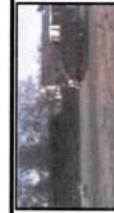
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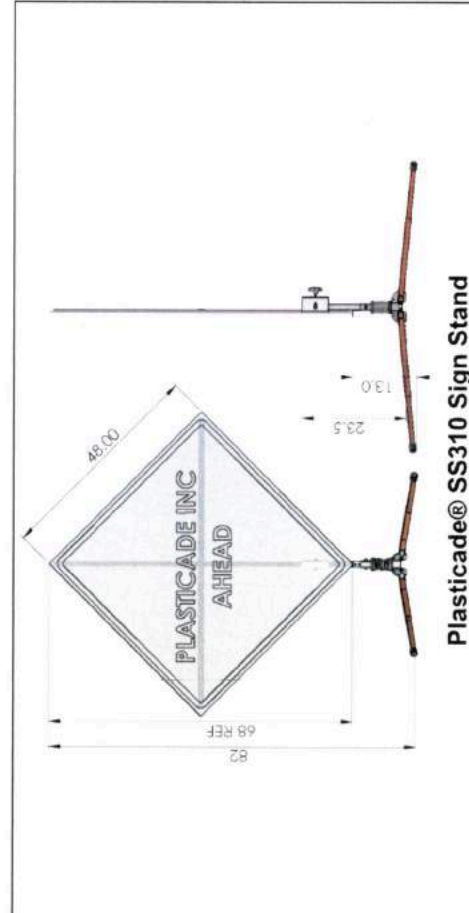


t = 0.190 sec



t = 0.333 sec

**Perpendicular (90 deg) Orientation**



**General Information**  
 Test Agency.....E-TECH Testing Services  
 Test Designation.....MASH Test 3-71  
 Test No.....76-0456-001  
 Date.....12/15/2015

**Test Article**  
 Type.....Plasticade  
 Universal Stand with Spring, Steel Legs (SS310)  
 Work-Zone Traffic Control Device  
 Dimensions.....208 cm OA Height x 173 cm Wide  
 Installation Details.....Industry Standard 48"x48" Rollup Sign  
 356 mm Sign Height (Bottom of Sign to Grade)  
 Material and Key Elements.....10 kg Stand, Steel Legs  
 2.3 kg Rollup Sign with Fiberglass Supports  
 Foundation Type.....Asphalt, clean and dry  
 and Condition

**Test Vehicle**  
 Type.....Production Model  
 Designation.....1100C  
 Model.....2009 Hyundai Accent  
 Curb.....1108.5 kg  
 Test Inertial.....1112.0 kg  
 Dummy.....N/A  
 Gross Static.....1112.0 kg

**Impact Conditions**  
 Speed (Normal Orientation).....99.8 kph  
 Speed (Perpendicular Orientation).....98.9 kph  
 Impact Severity (Normal Orientation).....427.3 kJ  
 Impact Severity (Perp. Orientation).....419.6 kJ

**Exit Conditions**  
 Speed (Normal Orientation).....98.9 kph  
 Speed (Perpendicular Orientation).....98.0 kph  
 Angle (deg).....0

**Vehicle Damage**  
 Exterior  
 VDS.....FC-0  
 CDC.....12FCEN0  
 Notable Deformation.....None

Interior  
 Maximum Deformation.....Negligible

**Figure 2 - Summary of Results – Plasticade® SS310 Sign Stand Test 76-0456-001**



**Normal (0 deg) Orientation**



t = 0.000 sec



t = 0.057 sec



t = 0.114 sec



t = 0.171 sec

**Perpendicular (90 deg) Orientation**



t = 0.000 sec



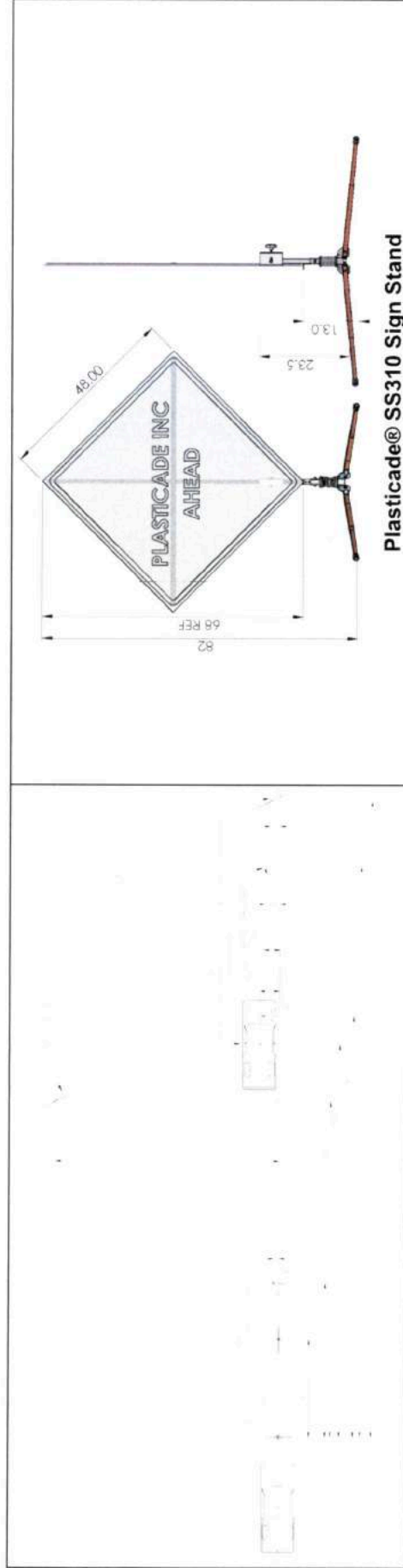
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t = 0.193 sec



t = 0.338 sec



**Plasticade® SS310 Sign Stand**

**General Information**

Test Agency..... E-TECH Testing Services  
 Test Designation..... MASH Test 3-72  
 Test No..... 76-0456-002  
 Date..... 11/14/2016

**Test Article**

Type..... Plasticade  
 Universal Stand with Spring, Steel Legs (SS310)  
 Work-Zone Traffic Control Device  
 Dimensions..... 208 cm OA Height x 173 cm Wide  
 Installation Details..... Industry Standard 48"x48" Rollup Sign  
 356 mm Sign Height (Bottom of Sign to Grade)  
 Material and Key Elements..... 10 kg Stand, Steel Legs  
 2.3 kg Rollup Sign with Fiberglass Supports  
 Foundation Type..... Asphalt, clean and dry  
 and Condition

**Test Vehicle**

Type.....  
 Designation..... 2270P  
 Model..... 2010 Dodge Ram  
 Curb..... 2192.0 kg  
 Test Inertial..... 2272.0 kg  
 Dummy..... N/A  
 Gross Static..... 2272.0 kg

**Impact Conditions**

Speed (Normal Orientation)..... 99.8 kph  
 Speed (Perpendicular Orientation)..... 97.8 kph  
 Impact Severity (Normal Orientation)..... 872.7 kJ  
 Impact Severity (Perp. Orientation)..... 838.1 kJ

**Exit Conditions**

Speed (Normal Orientation)..... 97.8 kph  
 Speed (Perpendicular Orientation)..... 95.8 kph  
 Angle (deg)..... 0

**Vehicle Damage**

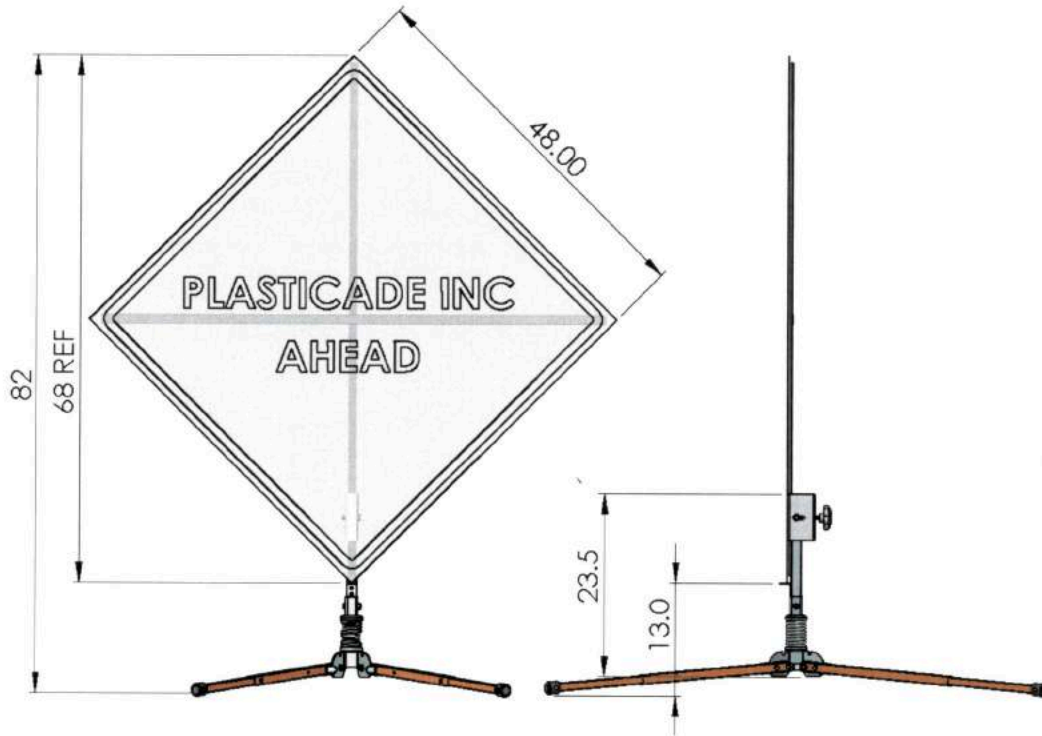
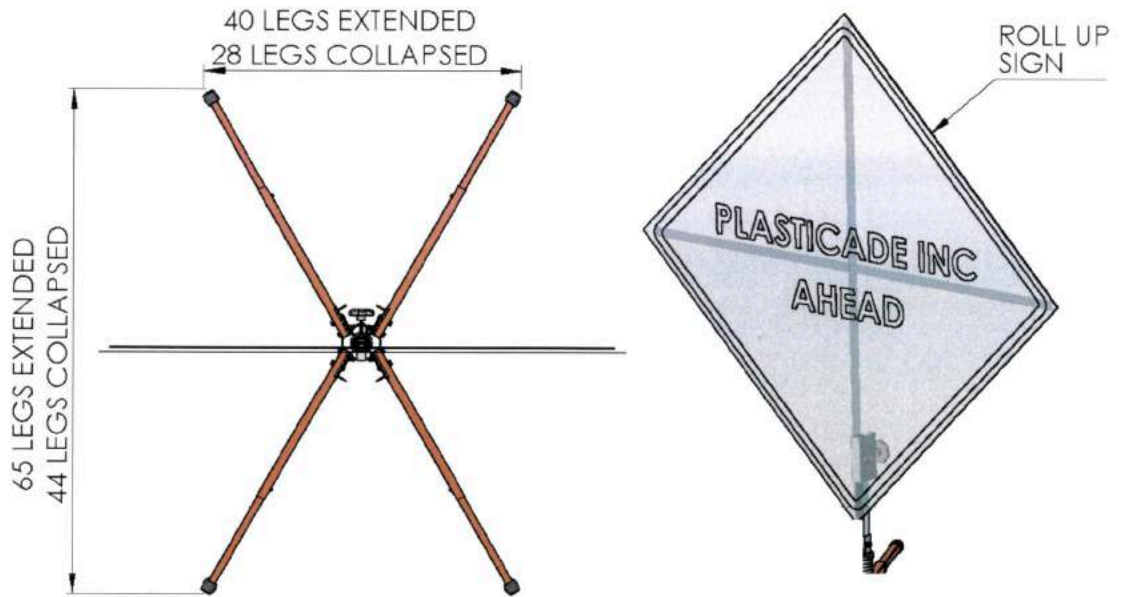
Exterior  
 VDS..... FC-1  
 CDC..... 12FCEN1  
 Notable Deformation..... None  
 Interior  
 Maximum Deformation..... Negligible

**Figure 6 - Summary of Results – Plasticade® SS310 Sign Stand Test 76-0456-002**



### APPENDICES

#### Appendix A - Details of Test Article



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 Q.A.  
 COMMENTS:

NAME DATE  
 SDK 090915 7700 N AUSTIN AVE SKOKIE IL  
 1-800-470-3300

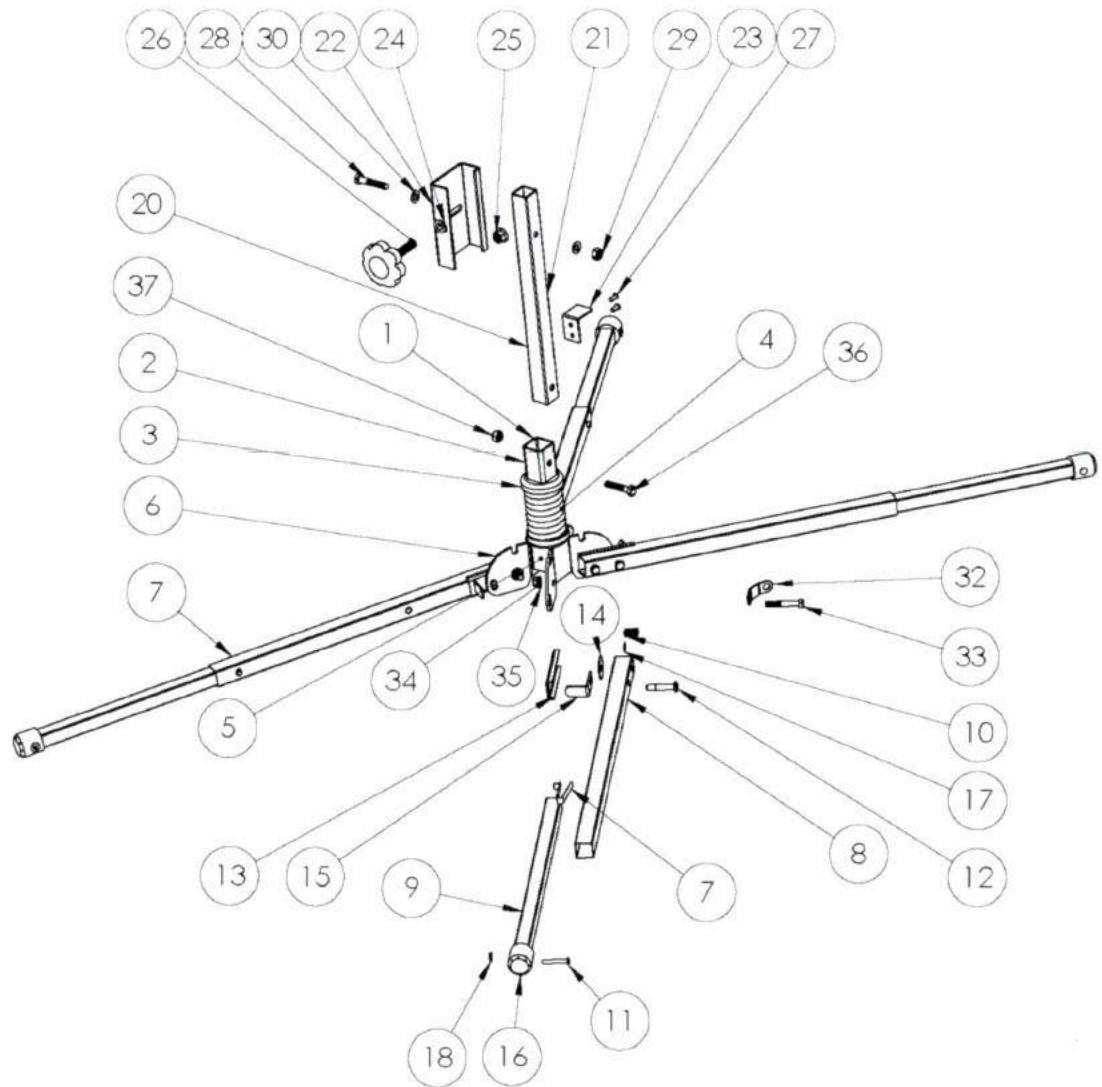
**PLASTICADE INC.**  
**COMPACT STEEL SPRING  
 UNIVERSAL HOLDER  
 STEEL LEGS**

SEE DWG. NO.  
**A**  
 SCALE: 1:20

SS310

REV. **E**  
 SHEET 1 OF 3

Illustration 1 – Plasticade® SS310 Technical Drawing (Sheet 1 of 3)



NOTE: WEIGHT 22 LBS (WITHOUT SIGN)

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 1-800-470-3300

COMPACT STEEL SPRING  
 UNIVERSAL HOLDER  
 STEEL LEGS

SIZ A DWG. NO.  
 SCALE 1/2"

SS310

REV E

SHEET 2 OF 3

Illustration 2 – Plasticade® SS310 Technical Drawing (Sheet 2 of 3)



SS310	31000	31000 STAND ASSEMBLY	RSM31000-150908			
ITEM	PART NUMBER	DESCRIPTION	DRAWING NUMBER	MATERIAL	FINISH	Quantity
1	BACS-D	COMPACT SPRING BASE ASSEMBLY	RSMB252-150908			1
2	BACS-V4	COMPACT SINGLE SPRING BASE MAST WELD TUBE	RSMB109-150908	STEEL Q235 A36	POWDER COAT	1
3	SPR CAP 66	SPRING CAP 66MM	RSMS150-140331	STEEL Q235 A36	POWDER COAT	2
4	SA-375-115 FLAT	COMPACT SINGLE SPRING	RSMS100-140331	STEEL SAE9254	POWDER COAT	1
5	BACS-02-V2	COMPACT BASE SPRING SUPPORT	RSMB202-140517	STEEL Q235 A36	POWDER COAT	1
6	BS	COMPACT BASE SIDE PLATE	RSMB102-150211	STEEL Q235 A36	POWDER COAT	2
7	30000 CSLA	COMPACT STEEL LEG ASSEMBLY	RSMLCSS-140619			4
8	SLR-30-560-V2	STEEL COMPACT STAND LEG LONG-ORANGE	RSML125-140728	STEEL Q215 A36	POWDER COAT	1
9	SLR-25-480-V2	STEEL COMPACT STAND SHORT LEG - ORANGE	RSML120-140517	STEEL Q215 A36	POWDER COAT	1
10	LLA-SPRING	LATCH SPRING	RSML164-140331	STAINLESS 302	STAINLESS	1
11	LSB-10	LEG SPRING BUTTON 10MM	RSML173-140331	STEEL	ZINC PLATE	1
12	LLA-PIN	LEVER PIN	RSML162-140730	STEEL Q215 A36	DICHROMATE	1
13	LLA-32-V2	LEG LEVER PIN COVER ALUM LEGS	RSML166-140331	STEEL Q235 A36	ZINC PLATE	1
14	LLA-LWASHER	WASHER .41 I.D. 1.5 O.D X .065	SEE WASHER SHEET	STEEL	ZINC PLATE	1
15	LLA-LEVER	LEG LEVER	RSML163-140817	STEEL Q235 A36	ZINC PLATE	1
16	RF-25	25MM RUBBER FOOT	RSML100-140331	RUBBER	RUBBER	1
17	LLA-CLIP	LEG LEVER CLIP (FOR LEVER PIN)	RSML165	STEEL SPRING	DICHROMATE	1
18	LLA-FOOT WASHER	WASHER .28 I.D. X .63 O.D. X .07	WASHER SHEET	STEEL	ZINC PLATE	1
19	RIVET-RF-42	RIVET STEEL ZINC 42MM	RIVET MASTER SHEET	STEEL	ZINC PLATE	1
20	SA-URSHV2	UNIVERSAL ROLL UP SIGN HOLDER	RSMA300R-150730			1
21	SA-URSH-01	SA-URSH-01 TUBE 38MM X 340MM X 2.5 WALL	RSMA301-140926	AL 6363 T5	ALUMINUM	1
22	SA-URSH-02	SA-URSH-02 CLAMP J-PLATE	RSMA302-140811	STEEL Q235 A36	ZINC PLATE	1
23	SA-URSH-03	SA-URSH-03 SUPPORT BRACKET	RSMA303-140811	STEEL Q235 A36	ZINC PLATE	1
24	SA-URSH-04	SA-URSH-04 RIV NUT	RSMA304-140331	STEEL	ZINC PLATE	1
25	SA-URSH-05	SA-URSH-05 FLANGE NUT 12 X 1.75 MM THREAD	RSMA305-140331	STEEL	ZINC PLATE	1
26	SA-URSH-06	SA-URSH-06 KNOB BOLT	RSMA306-140902	PLASTIC/STEEL	ZINC PLATE	1
27	RIVET-POP 6MM	RIVET FOR SUPPORT BRACKET	SEE RIVET MASTER	STEEL	ZINC PLATE	2
28		BOLT HEX CAP 10M X 1.50 X 55		STEEL GRADE 5	ZINC PLATE	1
29		NUT NYLON LOCK 10M X 1.50		STEEL GRADE 5	ZINC PLATE	1
30		WASHER .410 ID 1.00 OD X .07	WASHER SHEET	STEEL	ZINC PLATE	2
31	HARDWARE					
32	LC-3032V2	COMPACT BASE LEG CROSSOVER BRACKET	RSML140-140331	STEEL Q235 A36	ZINC PLATE	2
33	LLA-BOLT	BOLT HEX CAP 3/8-16 X 2-1/4	BOLT/NUT SHEET	STEEL GRADE 5	ZINC PLATE	4
34	LLA-NLN	NUT HEX NYLON LOCK 3/8-16	BOLT/NUT SHEET	STEEL	ZINC PLATE	4
35		WASHER .410 ID 1.00 OD X .07		STEEL	ZINC PLATE	4
36		BOLT HEX CAP 10M X 1.50 X 50		STEEL GRADE 5	ZINC PLATE	1
37		NUT NYLON LOCK 10M X 1.50		STEEL	ZINC PLATE	1

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 COMPACT STEEL SPRING  
 UNIVERSAL HOLDER  
 STEEL LEGS

SIZE DWG. NO.  
 A SS310  
 SCALE:1:20

REV: E  
 SHEET 3 OF 3

Illustration 3 – Plasticade® SS310 Technical Drawing (Sheet 3 of 3)