U.S. Department of Transportation
Federal Highway Administration

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

May 22, 2023

In Reply Refer To:
HSST-1/WZ-451

John Pasakarnis
DICKE Safety Products
1201 Warren Avenue
Downers Grove, IL 60515
United States of America

Dear Mr. Pasakarnis:

We received your correspondence of July 19, 2022 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-451.

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: SUF2000W sign stand with 48” x 48” Roll-Up Sign
Type of system: Work Zone
Test Level: Test Level 3
Testing conducted by: Applus IDIADA KARCO Engineering, LLC
Date of request: July 19, 2022

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-451 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 numberWZ-451. 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,

Amy Jackson-Grove
Acting Director, Office of Safety Technologies
Office of Safety

Enclosures

Request for Federal Aid Reimbursement Eligibility of Highway Safety Hardware

Submitter	Date of Request:	July 19, 2022	◉ New ○ Resubmission
	Name:	Joe Maly	
	Company:	DICKE Safety Products	
	Address:	1201 Warren Avenue, Downers Grove, IL 60515	
	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	◉ Physical Crash Testing ○ Engineering Analysis	SUF2000W 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:	Joe Maly	Same as Submitter ☒
Company Name:	DICKE Safety Products	Same as Submitter ☒
Address:	1201 Warren Avenue, Downers Grove, IL 60515	Same as Submitter ☒
Country:	United States of America	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.

Dicke 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 SUF2000W with 48" x 48" Roll-Up Sign
(Reference Drawing: SUF2000W (1))
The SUF2000W is a work-zone traffic control device used to display traffic control signs.

The DICKE Safety Products SUF2000W sign stand is a work-zone traffic control device. The as-tested device utilized a 48.0 in. (1.2 m) reflective square roll-up sign mounted at a height of 80.75 in. (6.7 m) measured from the ground level. The device has a total weight of 30.0 lbs (13.6 kg). The SUF2000W sign stand consists of a steel single upright spring base assembly. The telescoping legs of the base assembly consist of two (2) parts: an inner leg constructed of 1.25 in. steel tube with a wall thickness of 0.065 in. (1.7 mm) and an outer leg constructed of 1.00 in. steel tube a wall thickness of 0.068 in. (1.7 mm). The device was tested with four (4) sandbags weighing 25.0 lbs (11.3 kg) each. One sandbag was placed on each leg of the device. The base assemblt has a width of 45.5 in. (1.2 m), and a length of 68.5 in. (1.7 m). The carbon steel speedclamp bracket has a height from grade of 29.5 in. (0.7 m). The roll-up sign is mounted to the mast via a fiberglass cross brace constructed of 1.25 in. (0.3 m) wide and 66.25 in. (1.7 m) long. The total sign height measured at 68.0 in. (1.7 m).

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:	Brandon Ubina	
Engineer Signature:	Brandon Ubina — Digitally signed by Brandon Ubina DN: cn=Brandon Ubina, o, ou, email=Brandon.ubina@idiada.com, c=US Date: 2023.06.28 17:16:29 -07'00'	
Address:	9270 Holly Road, Adelanto, CA 92301	Same as Submitter ☐
Country:	United States of America	Same as Submitter ☒

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 30.0 lbs (13.6 kg) and therefore Test 70 was not performed.	Non-Relevant Test, not conducted

Required Test Number	Narrative Description	Evaluation Results
3-71 (1100C)	Applus IDIADA KARCO Test No. P41380-01 . Test Dates January 10, 2022. Crash Test Report No. TR-P41380-01-NC for MASH 2016 Test 3-71 Crash Test of DICKE Safety Products SUF2000W with 48" x 48" Roll-Up Sign. The 1100C test vehicle approached the test article at a nominal speed of 62 mph (100 km/h). The SUF2000W with 48" x 48" Roll-Up Sign impact was oriented at 0° and 90°. The SUF2000W with 48" x 48" Roll-Up Sign (P41380-01) was impacted by a 2016 Kia Rio 4-door sedan. The test vehicle impacted the 0° CIA device at a speed of 61.42 mph (98.84 km/h). The vehicle first made contact with the SUF2000W roll-up sign and speedclamp bracket. The vehicle's bumper proceeded to make contact with the SUF2000W roll-up sign and base assembly through the impact and the speedclamp bracket began to bend from the steel base. The crossbrace and roll-up sign began deforming around the vehicle's bumper and hood. The roll-up sign and crossbrace detached from the speedclamp bracket. The occupant compartment was not penetrated and the MASH deformation limits were not exceeded. The test vehicle impacted the 90° CIA device at a velocity of 59.77 mph (96.19 km/h). The vehicle first made contact with the roll-up sign. The crossbrace and roll-up sign began deforming around the vehicle's bumper and hood. The vehicle made contact with speedclamp bracket and began to bend it from the steel base. The roll-up sign detached from speed clamp bracket and the coil single spring detached from the base assembly. The occupant compartment was not penetrated and the MASH deformation limits were not exceeded. The SUF2000W with 48" x 48" Roll-Up Sign met all the requirements for MASH Test 3-71.	PASS

3-72 (2270P)	Applus IDIADA KARCO Test No. P41381-01 . Test Dates January 10, 2022. Crash Test Report No. TR-P41381-01-NC for MASH 2016 Test 3-72 Crash Test of DICKE Safety Products SUF2000W with 48" x 48" Roll-Up Sign. The 2270P test vehicle approached the test article at a nominal speed of 62 mph (100 km/h). The SUF2000W with 48" x 48" Roll-Up Sign impact was oriented at 0° and 90°. The SUF2000W with 48" x 48" Roll-Up Sign (P41381-01) was impacted by a 2016 Ram 1500 pickup truck. The test vehicle impacted the 0° CIA device at a speed of 63.09 mph (101.53 km/h). The vehicle first made contact with the SUF2000W roll-up sign and speedclamp bracket. The vehicle's bumper proceeded to make contact with the single spring upright and speedclamp bracket and both began to deform around the vehicle's bumper. The SUF2000W top and bottom mast assembly broke apart. As the vehicle proceeded forward, the roll-up sign made contact with the top of the vehicle's hood and detached from the cross brace. The occupant compartment was not penetrated and the MASH deformation limits were not exceeded. The test vehicle impacted the 90° CIA device at a velocity of 61.85 mph (99.55 km/h). The vehicle first made contact with the roll-up sign and cross brace. The sign's single spring upright and speedclamp bracket began to deform around the vehicle's bumper. The top and bottom mast broke apart. The sign's base assembly under rode the vehicle as it proceeded forward. The occupant compartment was not penetrated and the MASH deformation limits were not exceeded. The SUF2000W with 48" x 48" Roll-Up Sign met all the requirements 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:	Brandon Ubina Digitally signed by Brandon Ubina DN: cn=Brandon Ubina, o, ou, email=Brandon.ubina@idiada.com, c=US Date: 2023.06.28 17:17:20 -07'00'	
Address:	9270 Holly Road, Adelanto, CA 92301	Same as Submitter ☐
Country:	United States of America	Same as Submitter ☒
Accreditation Certificate Number and Dates of current Accreditation period :	International Accreditation Services (IAS) ISO 17025 Accreditation Certificate #TL-371 Expires July 1, 2022	

Submitter Signature*: Joe Maly Digitally signed by Joe Maly Date: 2023.06.29 16:16:26 -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.

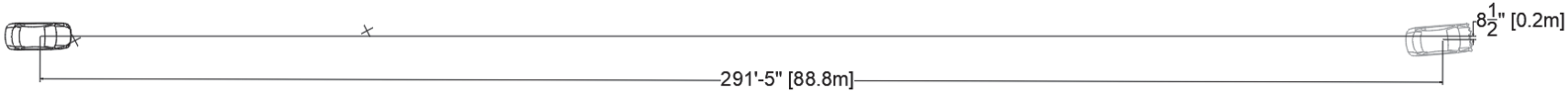
FHWA Official Business Only:

Eligibility Letter		
Number	Date	Key Words

MASH 2016 Test 3-71 Summary

0° CIA **90° CIA**

0.000 s 0.160 s 0.320 s 0.685 s 0.855 s 1.025 s



General Information

Test Agency	Applus IDIADA KARCO
Test Number	P41380-01
Test Designation	3-71
Test Date	1/10/22

Test Article

Name / Model	SUF2000W with 48" x48" Roll-Up Sign
Type	Work-Zone Device
Device Height	6.7 ft. (2.1 m)
Key Elements	Base, Telescopic Legs, Roll-Up Sign
Road Surface	Smooth, clean concrete

Test Vehicle

Type / Designation	1100C
Year, Make, and Model	2016 Kia Rio
Curb Mass	2,515.4 lbs (1,141.0 kg)
Test Inertial Mass	2,428.4 lbs (1,101.5 kg)
Gross Static Mass	2,605.8 lbs (1,182.0 kg)

Impact Conditions

Impact Velocity Device 1	61.42 mph (98.84 km/h)
Impact Velocity Device 2	59.77 mph (96.19 km/h)
Device 1 Angle	0.0°
Device 2 Angle	90.0°
Location / Orientation Device 1	16.1 in. (409 mm) From Vehicle Centerline on Passenger Side
Location / Orientation Device 2	18.5 in. (471 mm) From Vehicle Centerline on Driver Side
Device 1 Kinetic Energy	306.2 kip-ft (415.2 Kilajoules)
Device 2 Kinetic Energy	290.0 kip-ft (393.2 Kilajoules)
Minimum Kinetic Energy Required	288.0 kip-ft (390.0 Kilajoules)

Exit Conditions

Device 1 Exit Velocity	61.07 mph (98.3 km/h)
Device 2 Exit Velocity	58.90 mph (94.8 km/h)
Vehicle Resting Position	291.4 ft. (88.8 m) Downstream 0.7 ft. (0.2 m) Right
Device 1 Vehicle Stability	Satisfactory
Device 2 Vehicle Stability	Satisfactory
Device 1 Maximum Roll Angle	Did Not Exceed 75°
Device 2 Maximum Roll Angle	Did Not Exceed 75°
Device 1 Maximum Pitch Angle	Did Not Exceed 75°
Device 2 Maximum Pitch Angle	Did Not Exceed 75°

Occupant Risk

Longitudinal OIV	N/A*
Lateral OIV	N/A*
Longitudinal RA	N/A*
Lateral RA	N/A*
THIV	N/A*
PHD	N/A*
ASI	N/A*

Test Article Deflections

0° Sign Debris Field (longitudinal)	137.2 ft. (41.8 m)
0° Sign Debris Field (lateral)	19.1 ft. (5.8 m)
90° Sign Debris Field (longitudinal)	220.7 ft. (67.3 m)
90° Sign Debris Field (lateral)	5.1 ft. (1.6 m)

Vehicle Damage

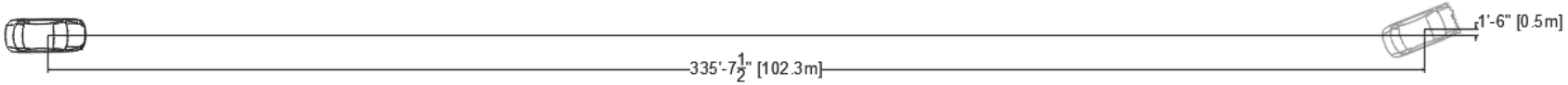
Vehicle Damage Scale	12-FC-1
CDC	12FDEN1
Device 1 Maximum Deformation	0.5 in. (13 mm) Windshield
Device 2 Maximum Deformation	0.2 in. (5 mm) Windshield

Figure 2 Summary of Test 3-71

MASH 2016 Test 3-72 Summary

0° CIA **90° CIA**

0.000 s 0.160 s 0.320 s 0.645 s 0.795 s 0.945 s



General Information

Test Agency	Applus IDIADA KARCO
Test Number	P41381-01
Test Designation	3-72
Test Date	1/10/22

Test Article

Name / Model	SUF2000W with 48" x 48" Roll-Up Sign
Type	Work-Zone Device
Device Height	6.7 ft. (2.1 m)
Key Elements	Base. Telescopic Legs, Roll-Up Sign
Road Surface	Smooth, clean concrete

Test Vehicle

Type / Designation	2270P
Year, Make, and Model	2016 RAM 1500
Curb Mass	5,112.4 lbs (2,319.0 kg)
Test Inertial Mass	5,011.0 lbs (2,273.0 kg)
Gross Static Mass	5,011.0 lbs (2,273.0 kg)

Impact Conditions

Impact Velocity Device 1	63.09 mph (101.53 km/h)
Impact Velocity Device 2	61.85 mph (99.55 km/h)
Device 1 Angle	0.0°
Device 2 Angle	90.0°
Location / Orientation Device 1	19.6 in. (499 mm) From Vehicle Centerline on Passenger Side
Location / Orientation Device 2	21.8 in. (554 mm) From Vehicle Centerline on Driver Side
Device 1 Kinetic Energy	666.7 kip-ft (904.0 Kilajoules)
Device 2 Kinetic Energy	640.9 kip-ft (869.0 Kilajoules)
Minimum Kinetic Energy Required	594.0 kip-ft (806.0 Kilajoules)

Exit Conditions

Device 1 Exit Velocity	62.77 mph (101.0 km/h)
Device 2 Exit Velocity	61.30 mph (98.7 km/h)
Vehicle Resting Position	335.6 ft. (102.3 m) Downstream 1.5 ft. (0.5 m) Left
Device 1 Vehicle Stability	Satisfactory
Device 2 Vehicle Stability	Satisfactory
Device 1 Maximum Roll Angle	Did Not Exceed 75°
Device 2 Maximum Roll Angle	Did Not Exceed 75°
Device 1 Maximum Pitch Angle	Did Not Exceed 75°
Device 2 Maximum Pitch Angle	Did Not Exceed 75°

Occupant Risk

Longitudinal OIV	N/A*
Lateral OIV	N/A*
Longitudinal RA	N/A*
Lateral RA	N/A*
THIV	N/A*
PHD	N/A*
ASI	N/A*

Test Article Deflections

0° Sign Debris Field (longitudinal)	78.0 ft. (23.8 m)
0° Sign Debris Field (lateral)	15.9 ft. (4.8 m)
90° Sign Debris Field (longitudinal)	95.1 ft. (29.0 m)
90° Sign Debris Field (lateral)	40.3 ft. (12.3 m)

Vehicle Damage

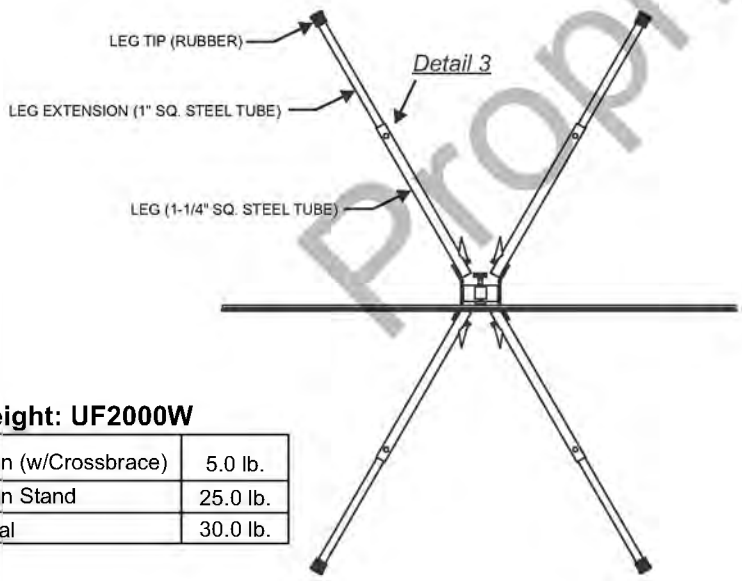
Vehicle Damage Scale	12-FD-1
CDC	12FDEW1
Device 1 Maximum Deformation	0.0 in. (0 mm)
Device 2 Maximum Deformation	0.0 in. (0 mm)

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

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

Figure 2: Summary of Test 3-72

SUF2000W



Weight: UF2000W

Sign (w/Crossbrace)	5.0 lb.
Sign Stand	25.0 lb.
Total	30.0 lb.

SUF2000W STAND

- Base- Steel with single upright spring system
- Legs- Telescopic 1-1/4" and 1" sq. x. 065" steel tubing

VINYL ROLL-UP SIGN

- Panel - vinyl, 48" x 48"
- Crossbrace- Vertical member is 1-1/4" w x 66-1/4" long fiberglass
- Crossbrace- Horizontal member is 1-1/4" w x 66-1/4" long fiberglass

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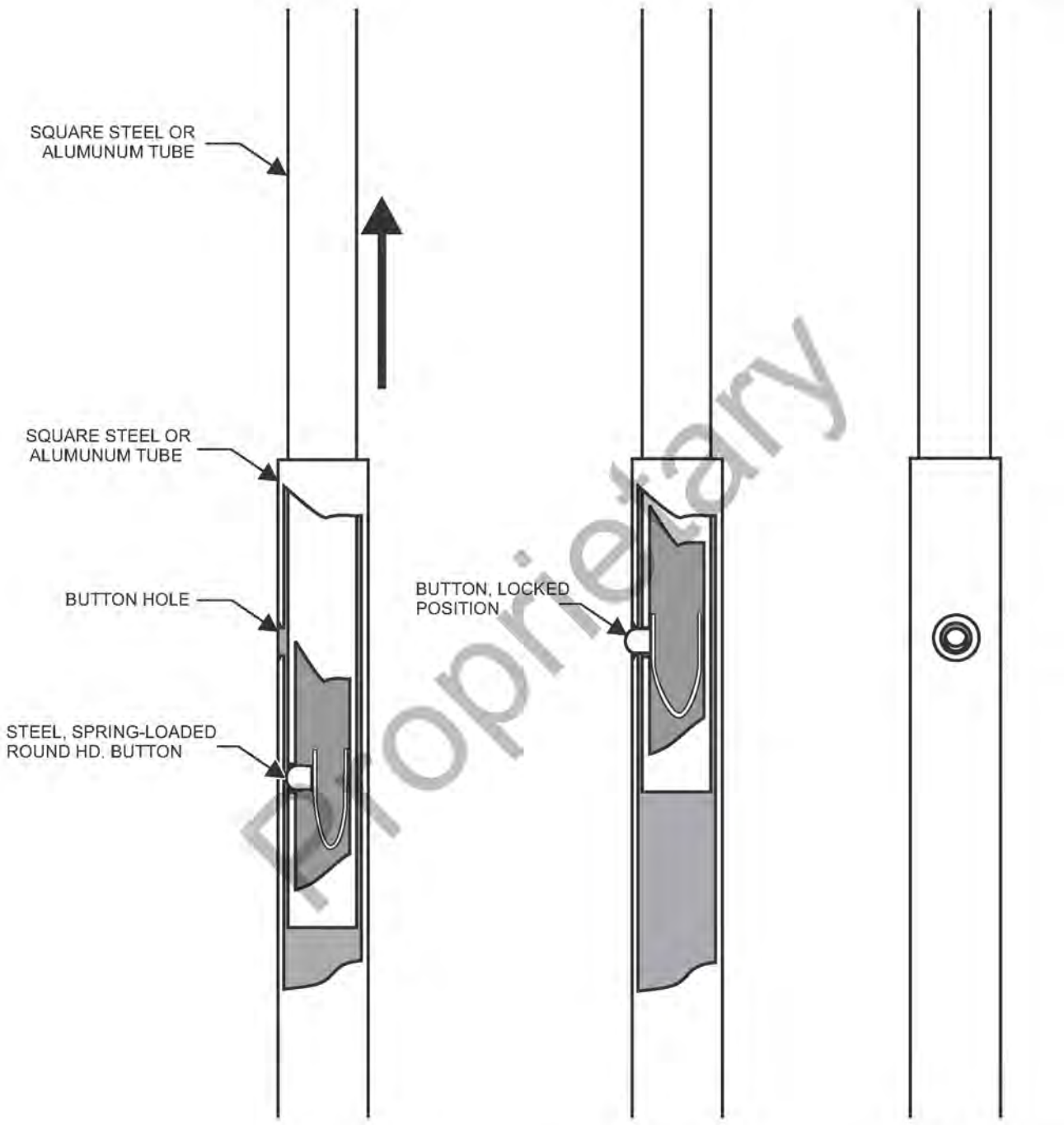
Oregon – 1845 Anunsen Street N.E. • Salem, OR 97301 • Ph: 800.333.5641 • Fax: 503.364.0340

ATTACHMENT METHODS

REF: DETAIL 3 (TELESCOPING TUBES)



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