



August 18, 2000

Refer to: HSA-1

Ms. Karen Wasielewski
Traffic Control Products of Florida, Inc.
5514 Carmack Road
Tampa, Florida 33610

Dear Ms. Wasielewski:

Thank you for your May 12 letter requesting Federal Highway Administration (FHWA) acceptance of various traffic control devices for use in work zones on the National Highway System (NHS). You requested that we review tests of Type II and Type III barricades and Vertical Panels as manufactured by Bob's Barricades of Florida as your company participated in the crash testing program. Accompanying your letter was a report from E-Tech Testing Services, Inc., a detailed description and drawing of each device, and videos of the crash tests. You requested that we find the lights and channelizing devices acceptable for use on the NHS under the provisions of National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

Introduction

The FHWA guidance on crash testing of work zone traffic control devices is contained in two memoranda. The first, dated July 25, 1997, titled "Information: Identifying Acceptable Highway Safety Features," established four categories of work zone devices: Category I devices were those lightweight devices which could be self-certified by the vendor, Category II devices were other lightweight devices which needed individual crash testing, Category III devices were barriers and other fixed or massive devices also needing crash testing, and Category IV devices were trailer mounted lighted signs, arrow panels, etc. The second guidance memorandum was issued on August 28, 1998, and is titled "INFORMATION: Crash Tested Work Zone Traffic Control Devices." This later memorandum lists devices that are acceptable under Categories I, II, and III.

A brief description of the devices for which you are requesting acceptance follows. Drawings of each are enclosed for reference.

- A) Type II Barricade: The legs are 32-mm x 32-mm x 11 gauge mild steel angle iron attached at the top with 12.7 mm diameter x 25.4 mm long hex cap screws with nuts and lock washers. The top and bottom panels are 203 mm wide 14 gauge steel. The panels are attached to the legs with 6.35 mm x 19 mm long hex cap screws with nuts and lock washers. An Empco-Lite warning light Model 499 Type A & C was attached to the top of the barricade via a 12.7 mm diameter cadmium plated steel bolt and a

38.1mm diameter, 19mm high cup washer. The typical length of the bolt is 95.25 mm. The total mass of the tested barricades 15.6 kg each.

- B) Type III Barricade: The legs are 38 mm x 38 mm x 4.8 mm mild steel angle iron supports. Affixed to the upright supports are three 203 mm wide, 22 mm thick hollow core extruded plastic panels using 7.9 mm x 38.1 long hex cap screws with nuts and lock washers. An Empco-Lite Warning light Model 212 Type B was attached to the top of the barricade via a 12.7 mm diameter cadmium plated steel bolt and a 38.1mm diameter, 19mm high cup washer. The total mass of the tested barricades 25.5 kg each.
- C) Vertical Panel: The legs are 32 mm x 32 mm x 11 gage mild steel angle iron. Two 305 mm wide, 4.8 mm thick plastic panels are affixed to the legs. An Empco-Lite Warning light Model 499 Type was attached to the top of the barricade via a 12.7 mm diameter cadmium plated steel bolt and a 38.1mm diameter, 19mm high cup washer. The total mass of the tested vertical panels was 12.2 kg each.

Testing

Full-scale automobile testing was conducted on Bob's Barricades Type II barricade and vertical panels with Empco-Lite warning lights attached. Two stand-alone examples of the device were tested in tandem, one head-on and the next placed six meters downstream turned at 90 degrees, as called for in our guidance memoranda.

The crash testing is summarized in the table below:

Test Number	19-0101-001	19-0101-002	19-0101-003
Test Article	Type II	Type III	Vertical Panel
Height to Top of Rails	1092 mm	1524 mm	1067 mm
Width of Barrier unit	610 mm	1524 mm	305 mm
Test Article Mass (each)	15.6 kg	25.5 kg	12.2 kg
Empco-Lite model #	Model 499 A & C	Model 212 Type B	Model 199
Mass of warning light	1.95 kg	2.07 kg	1.95 kg
Vehicle Inertial Mass	818 kg	817 kg	815 kg
Impact Speed, Head-on	102.5 km/h	102.5 km/h	101.1 km/h
Impact Speed, 90 Deg.	101.8 km/h	99.0 km/h	98.3 km/h
Velocity Change, Head-on	0.2 m/sec.	1.0 m/sec.	0.8 m/sec.
Velocity Change, 90 Deg.	0.2 m/sec.	1.0 m/sec.	0.8 m/sec.

Vehicle crush	Grill & hood dents	Grill & hood dents	Grill & hood dents
Occupant Compart. Intrusion	None	None	None
Windshield Damage Head-on	No contact	Moderate cracking	No contact
Windshield Damage 90 Deg.	No contact	No contact	No contact

Findings

Damage to the vehicle was limited to dents to the grill and hood. The test articles did not show potential for penetrating the occupant compartment. The results of this testing met the FHWA requirements and, therefore, the devices listed above are acceptable for use as Test Level 3 devices on the NHS under the range of conditions tested, when proposed by a state. Please also note that our acceptance of Type II barricades extends to Type I barricades of the same design except that the lower rail is not reflectorized.

In addition, Empco-Lite warning lights are acceptable for use on these channelizing devices as shown in the following table:

	Type II Barricades	Type III Barricades	Vertical Panel
Empco-Lite model #s	Model 499 A & C Model 199	Model 212 Type B Model 499 Model 199	Model 199 Model 499 A & C
Mass of warning light	1.95 kg	2.07 kg	1.95 kg

Model 499 and 199 warning lights are interchangeable by virtue of their similar weight and construction, and may be substituted on Type III barricades because they are lighter than the light tested with the Type III barricade. Empco-Lite “Y2K” lights may be substituted for any of the above as their 1.2 kg mass is less than any of the tested lights. Note that all warning light attachments shall use the 38.1mm diameter, 19mm high cup washer to reduce the possibility of separation.

Please note the following standard provisions which apply to FHWA letters of acceptance:

- ! Our acceptance is limited to the crashworthiness characteristics of the devices and does not cover their structural features, nor conformity with the Manual on Uniform Traffic Control Devices (MUTCD).
- ! Any changes that may adversely influence the crashworthiness of the device will require a new acceptance letter.
- ! Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals unacceptable safety problems, or that the device being marketed is significantly different from the version that was crash tested, it reserves the right to modify or revoke its acceptance.
- ! You will be expected to supply potential users with sufficient information on design and

installation requirements to ensure proper performance.

- ! You will be expected to certify to potential users that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as that submitted for acceptance, and that they will meet the crashworthiness requirements of FHWA and NCHRP Report 350.
- ! To prevent misunderstanding by others, this letter of acceptance, designated as number WZ-48, shall not be reproduced except in full.
- ! Some features of these lighted barricades may be patented products and considered "proprietary." The use of proprietary work zone traffic control devices in Federal-aid projects is generally of a temporary nature. They are selected by the contractor for use as needed and removed upon completion of the project. Under such conditions they can be presumed to meet requirement "a" given below for the use of proprietary products on Federal-aid projects. On the other hand, if proprietary devices are specified for use on Federal-aid projects, except exempt, non-NHS projects, they: (a) must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that they are essential for synchronization with 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, a copy of which is enclosed.

Sincerely yours,



Frederick G. Wright, Jr.
Program Manager, Safety

Traffic Control Products of FL, Inc.

Type II Barricade
with Empco-Lite Mdl. 499
Type A_C Warning Light



Specifications:

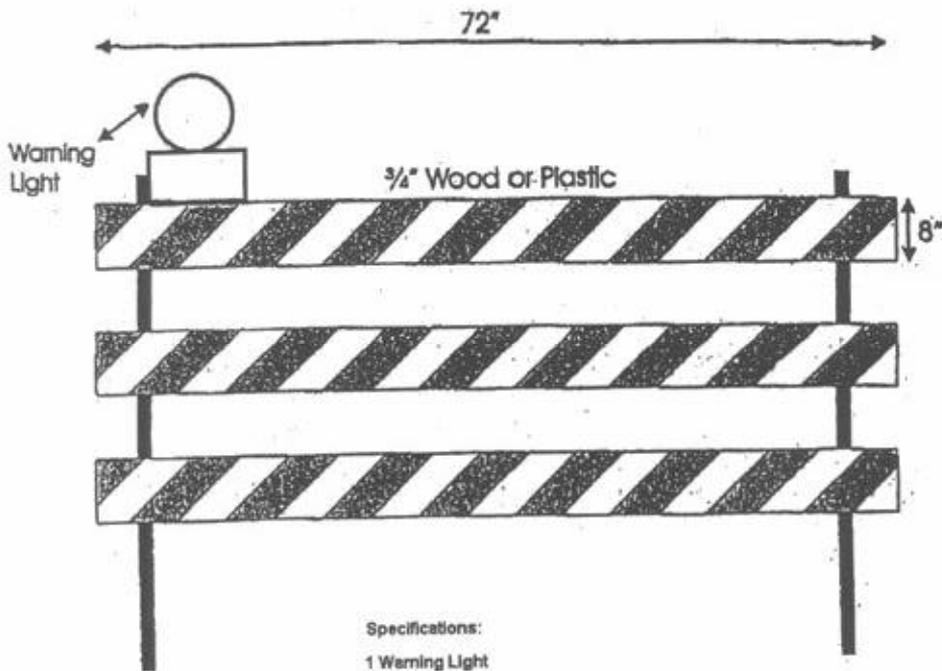
4 Galvanized Barricade legs,
Warning Light,
High Intensity Sheeting
Bolts, Washers and Nuts

Height-1092 mm (w/o Light)
Width-610mm (Panel)
Mass-15.6kg (complete)
Panel-203mm x 610mm
14 gauge steel sheet

Traffic Control Products of FI., Inc.

Type III Barricade
with Empco Lite Mdl. 212
Type B Warning Light
Normal Perpendicular

Height 1524 mm (w/o Light)
Width 1524mm (panel)
Mass 25.5kg (complete)
Panel 203mm x 1524mm
Plastic Extrusion

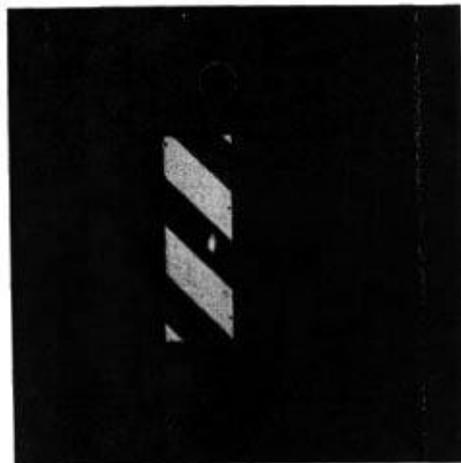
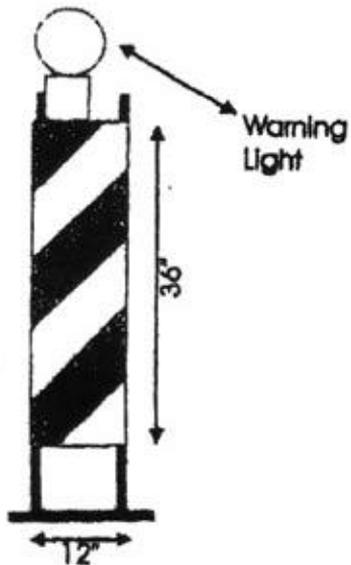


Specifications:

- 1 Warning Light
- 3-6"x8" wooden or plastic panels with pre-stripped High Intensity sheeting
- 2-Galvanized legs 2" x 2" x 3/16" sq tubing



Traffic Control Products of FI., Inc.
Vertrical Panel with Empco-Lite MDI. 499



Specification:

- 1 Warning Light
- 4 Galvanized Barricade Legs
- Prestriped-High Intensity Sheeting
- 2 Plastic or Steel Panels
- Bolts, Washers and Nuts

Height 1067mm (w/o Light)
Width 305mm (panel)
Mass 12.2kg (complete)
Panel 305mm x 914mm
plastic sheet



TYPE "A" and "C" BARRICADE WARNING LIGHTS

MODEL 100 - 2

- Patented lexan nut attached lens to upper case
- Eliminates the need for washers and self tapping screws

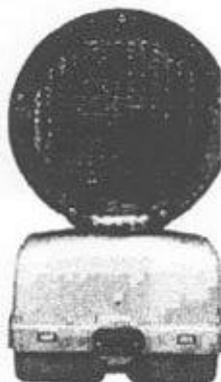
MODEL 100

New Lexan ring and washer using self tapping screws

- Eliminates corrosion problems with metal parts
- Uses same size screw as lens halves
- Hi tech design for fast repair of damaged lenses
- Strengthens the light thus making this the strongest barricade light available

A
N
D

MODEL 400



Upper case design eliminates the need for the rubber neck ring.

- LENS:** 7" Polycarbonate Fresnel design with 5/8" reflector ring Meets S.A.E. Standards J576B and J594D Available in Amber, Red, Green, Blue and Clear Polycarbonate reflectors are available upon request
- HOUSING:** Model 100 - Hi-density polyethylene - UV stabilized
Model 400 - Hi-impact polypropylene - UV stabilized
Available in Yellow, Orange, Green, Red, Black and White
Custom molded case identification and/or hot stamp imprinting available upon request
Ultraviolet stabilized case materials assure outdoor durability.



Totally enclosed, moisture proof hybrid circuit using the latest state of the art electronic components. Reverse polarity protected. Available in flashing and steady burn in or 12 volt in or without photo electric switch. Standard flash rate is 60z 10 FPM and on time is a maximum of 10% of the flash cycle. Special purpose circuits with various flash rates and on times are available upon request.

solid-state circuitry provides extended battery life, improved trouble-free performance.

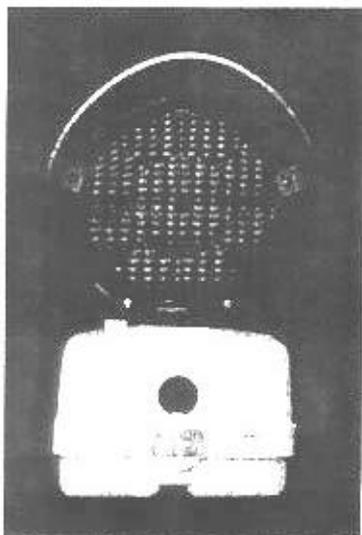
- WARRANTY:** The electronic circuit is guaranteed for a period of two years from date of purchase against defects in materials and workmanship. EMPCO as its option, will repair or replace defective product returned freight prepaid within the warranty period. Both the 100 and 400 models are packed in 100 per carton. In addition, each carton contains one (1) switch pin, ten (10) bolts and one wrench. Weight per carton - 24 pounds.
- PACKAGING:** The standard slinger drill mounting bolt is 1/2" x 3-3/4" with a pyramid shaped head. Half moon and S shaped bolt/nut head bolts in various lengths and nut protectors are available upon request.
- HARDWARE:**



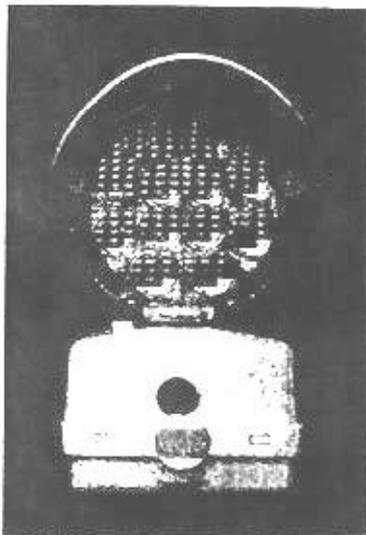
Wrenches use standard 1/2" socket drive allowing fast attachment of lights to barricade.



212 LED LIGHT



Alert motorists of
upcoming stopping
areas



Alert motorists of
upcoming construction
zones

HIGHLIGHTS:

- Provides a greater brightness than standard barricade lights
- Batteries will last approximately 24 days as tested with 2 Rayovac® HD batteries
- Uses an LED "Hi-Intensity" ("B") Light circuit. It uses only 20% of the current of what a regular 957 incandescent bulb uses.
- Exceeds ITE purchase specifications for Type "A" warning lights.
- Tested and exceeds Type "B" specifications.

EMPCO-LITE DIV.

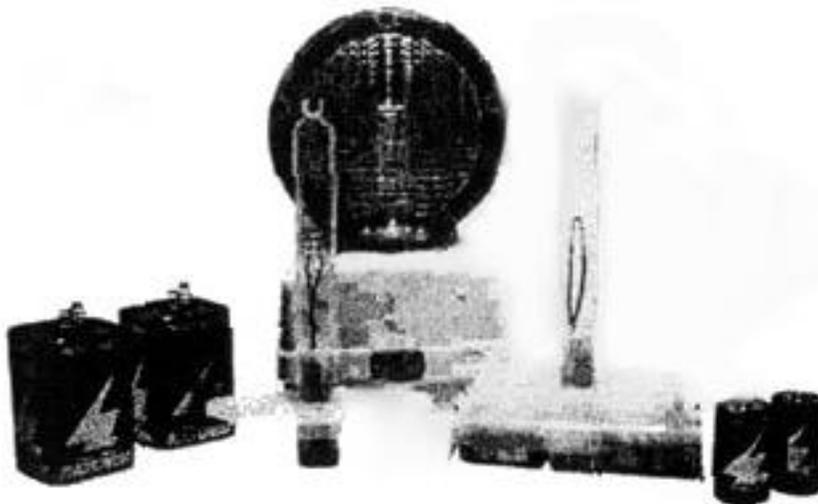
Elgin Molded Plastics Inc., 909 Grace Street, Elgin, IL 60120
(847) 931-2455 • 800-548-5483 • FAX (847) 931-2454

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Illustration C-4. Empco-Lite General Product Information (2 of 5)



LED Barricade Breakaway Candle



Model 499L

(for use with two 6 volt lantern batteries)

Model 444L

(for use with four D-cell batteries)

Highlights of new Breakaway Design for Models 444 and 499:

- Protects expensive LED circuitry when head assemblies are damaged
- Reduce Repair and Maintenance Costs
- Increase your income with the many benefits of LED technology
- Provide added safety to the motoring public from this long-lasting and bright light
- Exceeds I.T.E. Purchase Specifications and MUTCD for Types A and C Barricade Lights
- New Lens design has built-in stop to eliminate wire damage
- Tested by Calconst ITL #0115--1B/C99

See the Difference!

EMPCO-LITE DIV.

Elgin Molded Plastics Inc., 909 Grace Street, Elgin, IL 60120
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[Page 198-199]

TITLE 23--HIGHWAYS

CHAPTER I--FEDERAL HIGHWAY ADMINISTRATION, DEPARTMENT OF TRANSPORTATION

PART 635--CONSTRUCTION AND MAINTENANCE--Table of Contents

Subpart D--General Material Requirements

Sec. 635.411 Material or product selection.

(a) Federal funds shall not participate, directly or indirectly, in payment for any premium or royalty on any patented or proprietary material, specification, or process specifically set forth in the plans and specifications for a project, unless:

(1) Such patented or proprietary item is purchased or obtained through competitive bidding with equally suitable unpatented items; or

(2) The State highway agency certifies either that such patented or proprietary item is essential for synchronization with existing highway facilities, or that no equally suitable alternate exists; or

(3) Such patented or proprietary item is used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes.

(b) When there is available for purchase more than one nonpatented, nonproprietary material, semifinished or finished article or product that will fulfill the requirements for an item of work of a project and these available materials or products are judged to be of satisfactory quality and equally acceptable on the basis of engineering analysis and the anticipated prices for the related item(s) of work are estimated to be approximately the same, the PS&E for the project shall either contain or include by reference the specifications for each such material or product that is considered acceptable for incorporation in the work. If the State highway agency wishes to substitute some other acceptable material or product for the material or product designated by the successful bidder or bid as the lowest alternate, and such substitution results in an increase in costs, there will not be Federal-aid participation in any increase in costs.

(c) A State highway agency may require a specific material or product when there are other acceptable materials and products, when such specific choice is approved by the Division Administrator as being in the public interest. When the Division Administrator's approval is not obtained, the item will be nonparticipating unless bidding procedures are used that establish the unit price of each acceptable alternative. In this case Federal-aid participation will be based on the lowest price so established.

(d) Appendix A sets forth the FHWA requirements regarding (1) the specification of alternative types of culvert pipes, and (2) the number and types of such alternatives which must be set forth in the specifications for various types of drainage installations.

(e) Reference in specifications and on plans to single trade name materials will not be approved on Federal-aid contracts.