



September 21, 2000

Refer to: WZ-52

Mr. David Nelson
Marketing Manager
Reflexite
315 South Street
New Britain, Connecticut 06051

Dear Mr. Nelson:

Thank you for your June 9, 2000 letter requesting Federal Highway Administration (FHWA) acceptance of your company's rigid plastic sign substrate for use with certain portable sign stands as crashworthy traffic control devices. Stands with the Reflexite EnduranceTM substrate are intended for use in work zones on the National Highway System (NHS). Accompanying your letter was a report from the Midwest Roadside Safety Facility, and videos of the crash tests. You requested that we find the listed 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:

Test No. FG-1 System Nos. 1 and 2 - heavy duty, double torsion spring mounted DF4000 stand with a rigid, high-strength EnduranceTM sign panel, 1220 mm x 1220 mm, oriented end-on and head-on.

Test No. FG-2 System Nos. 3 and 4. - Heavy duty, double-torsion spring mounted DF-4700TX stand with a rigid, high-strength EnduranceTM sign panel, 1220 mm x 1220 mm, oriented end-on and head-

on.

EnduranceTM sign panels are 16 mm thick high performance thermoplastic. In cross-section they are open-cell structures, with each cell being 20 mm long and 8 mm thick. Each panel consists of two layers of cells extruded together.

Testing

Full-scale automobile testing was conducted on your company's sign blanks on portable sign stands. Two stand-alone examples of the device were tested in tandem, one end-on and the next placed six meters downstream turned at 90 degrees, as called for in our guidance memoranda. The complete devices as tested are shown in the Enclosure 1.

The crash test is summarized in the table below:

Test Number	FG-1	FG-2
Test Article	DF4000 with Endurance	DF-4700TX with Endurance
Height to Bottom of Sign	457 mm	1524 mm
Height to Top of Sign	2184 mm	3258 mm
Flags	Three with wood sticks	Three with wood sticks
Test Article Mass (each)	13.6 kg	17.2 kg
Sign panel mass	5.0 kg	5.0 kg
Vehicle Inertial Mass	806 kg	806 kg
Impact Speed,90 Deg	104.4 km/hr	108.2 km/hr
Impact Speed, Head-on	97.3 km/hr	104.7 km/hr
Velocity Change	1.8 m/sec	1.0 m/sec
Vehicle crush	Hood & bumper scrapes	Roof, hood & bumper scrapes
Occupant Compart. Intrusion	None	None
Windshield Damage 90 Deg.	Moderate spider web cracks	Minor starring and cracking
Windshield Damage Head-on	Minor starring and cracking	None

Findings

Damage to the vehicle was limited to scrapes to the hood, bumper, and roof, and minor to moderate cracking of the windshield. 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 and illustrated in Enclosure 1 are acceptable for use as Test Level 3 devices on the NHS under the range of conditions tested, when proposed by a state. In addition, Reflexite Endurance™ sign panels may be used on any other sign support, temporary or permanent, that has been successfully tested with conventional rigid aluminum (i.e. "0.080" thickness) or plywood signs. When used in permanent installations on breakaway supports, Endurance™ sign panels must be firmly fastened to the support in the same manner as other rigid sign substrates.

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

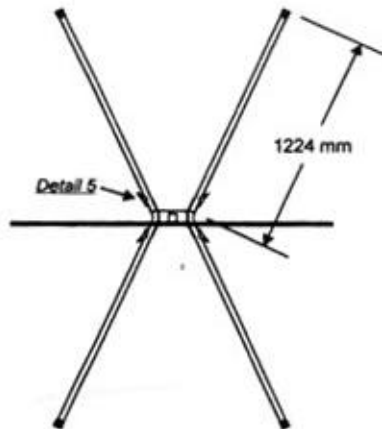
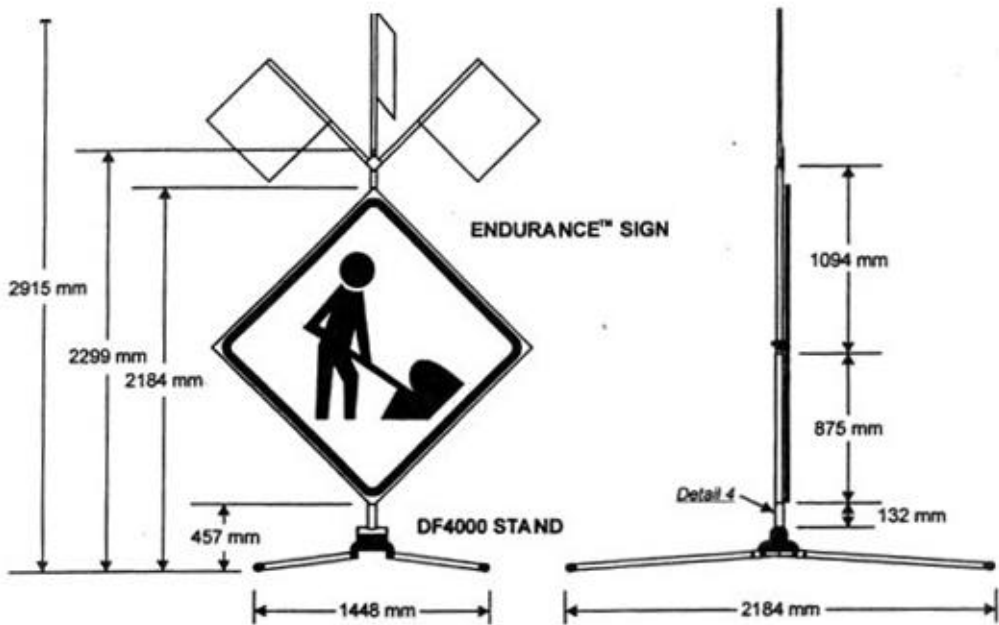
- ! Our acceptance is limited to the crashworthiness characteristics of the devices and does not cover their structural features, nor conformity with the Manual on Uniform Traffic Control Devices (MUTCD).
- ! Any changes that may adversely influence the crashworthiness of the device will require a new 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-52, shall not be reproduced except in full.
- ! Endurance sign substrates are 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,

A handwritten signature in cursive script, appearing to read "F. G. Wright, Jr.", is centered on the page.

Frederick G. Wright, Jr.
Program Manager, Safety



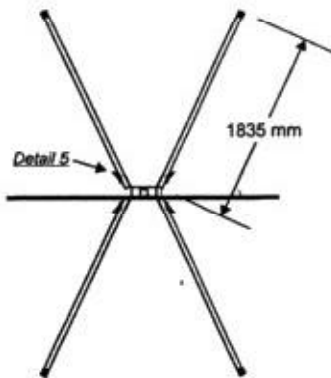
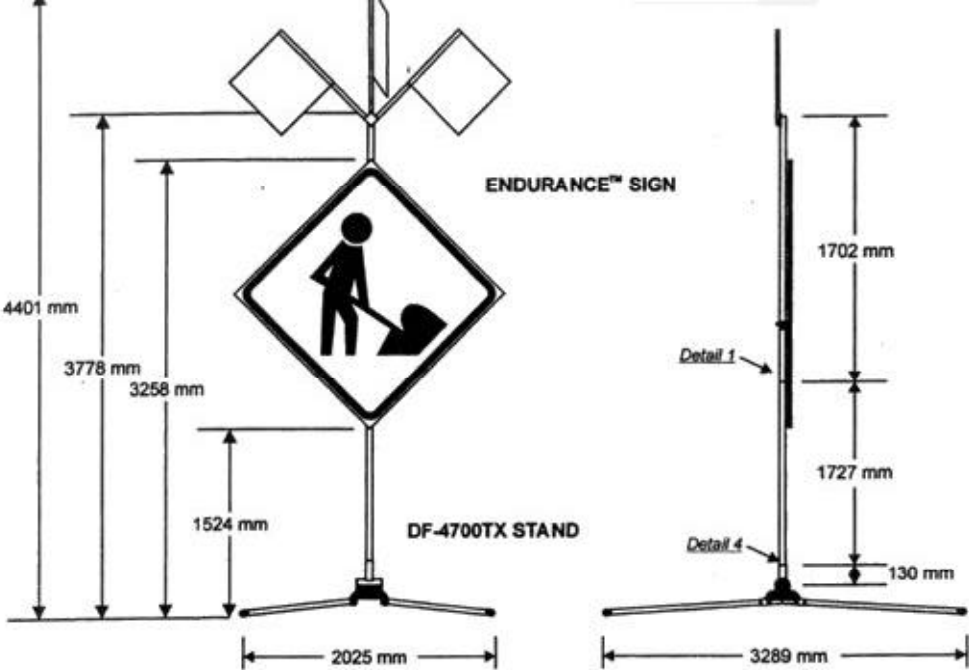
DF4000 STAND

- Base- Steel with heavy duty dual torsion spring system
- Mast- 2 stage telescoping, lower stage is 38.06 mm sq. aluminum tubing with 2.98 mm wall thickness and upper stage is 31.94 mm sq. aluminum tubing with 2.54 mm wall thickness
- Legs- 31.69 mm sq. x 2.67 mm wall x 1224 mm long aluminum legs

ENDURANCE™ SIGN

- Panel- High-strength plastic, 1222 mm wide x 1227 mm long with a 16.37 mm thickness
- 3 Flags- 451 mm x 457 mm vinyl with 610 mm long (19.68 mm dia.) wood staff

Figure 1. System Nos. 1 and 2 Sign Support Details, Test FG-1



DF-4700TX STAND

- Base- Steel with heavy duty dual torsion spring system
- Mast- 2 stage telescoping, lower stage is 38.08 mm sq. aluminum tubing with 2.50 mm wall thickness and upper stage is 31.75 mm sq. aluminum tubing with 2.51 mm wall thickness
- Legs- 31.70 mm sq. x 2.63 mm wall x 1835 mm long aluminum legs

ENDURANCE™ SIGN

- Panel- High-strength plastic, 1222 mm wide x 1218 mm long with a 16.37 mm thickness
- 3 Flags- 457 mm x 457 mm vinyl with 610 mm long (19.68 mm dia.) wood staff

Figure 4. System Nos. 3 and 4 Sign Support Details, Test FG-2

[Code of Federal Regulations]
[Title 23, Volume 1]
[Revised as of April 1, 1998]
From the U.S. Government Printing Office via GPO Access
[CITE: 23CFR635.411]

[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.