

Refer to: HSA-10/WZ-147

Mr. Geoff Grzywinski  
Reflexite Americas  
315 South Street  
New Britain, Connecticut 06051

Dear Mr. Grzywinski

This is in response to your letters of December 20, 2002, and January 9, 2003, requesting Federal Highway Administration (FHWA) acceptance of your company's 10 mm thick Endurance® sign substrate material for use on crashworthy traffic control devices in work zones on the National Highway System (NHS). Accompanying your letter was a comparison of the Reflexite Endurance 10 mm material with other sign substrates. You requested that we find 10 mm Endurance 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." Specifically, you requested that 10 mm Endurance be accepted wherever the following substrates have been previously tested and/or accepted for use:

Reflexite Americas Endurance 16 mm  
Stabler Industries 5/8 injection molded high density polyethylene  
Various 10mm corrugated plastics, including IntePro, CoroPlast, and SafetyCor  
Aluminum / Plastic composites, including Alpolic, Renalite, and Aluswiss

### **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.

Most crash testing of portable sign stands was for specific combinations of sign substrate and stand. Early testing focused on roll-up signs on X-footprint sign stands. Recent testing has looked at rigid substrates and the "worst case scenario" tests. The testing has included the most critical combination(s) of stand and sign. FHWA has accepted a range

of substrates on various manufacturers' stands by observing tests that "bracketed" the materials that the stand could be expected to support.

## **Testing**

### **Comparison to 16 mm Endurance**

Full scale crash testing was conducted on 16 mm Endurance signs by Reflexite using Dicke Tool sign stands. These devices were found acceptable via FHWA Acceptance Letter WZ-52 dated September 21, 2000. Because the 16 mm Endurance substrate can be considered a "worst case scenario" when comparing it to 10 mm Endurance, the lighter substrates will be acceptable for use on any stand successfully tested with the 16 mm material.

### **Comparison to 10 mm polypropylene**

Various manufacturers' 10 mm thick polypropylene substrates have been tested on a number of different stands that have received FHWA letters of acceptance, namely:

WZ-23 dated October 26, 1999,  
 WZ-46 dated July 21, 2000,  
 WZ-74 dated March 15, 2001,  
 WZ-78A dated June 15, 2001  
 WZ-103A dated March 6, 2002

The 10 mm Endurance substrate is fabricated from the same high performance thermoplastic material as 16 mm Endurance, but in the same structure (cell wall thickness, spacing of ribs, etc.) as the 10 mm polypropylene substrates. Your in-house bending tests show that its static behavior is similar to that of 0.080 solid aluminum, though it is approximately half the weight. Those flexibility tests showed the 10 mm Endurance was stiffer than the polypropylene substrates, however their mass and construction is very similar (less than a 10 percent difference in weight.) We believe that the difference in real-world performance between these 10 mm plastics will not likely be observable.

## **Findings**

We concur in your request that 10 mm Endurance sign panels will be acceptable on sign stands successfully crash tested with heavier / stiffer substrates such as

Reflexite Americas Endurance 16 mm  
 Stabler Industries 5/8 injection molded hdpe  
 Aluminum / Plastic composites, including Alpolic, Renalite, and Aluswiss

It will also be considered acceptable on sign stands successfully crash tested with the other 10 mm corrugated plastic substrates such as

IntePro, CoroPlast, and SafetyCor

This action does not make all lightweight substrates interchangeable on all sign stands. Although 10 mm Reflexite may be used on stands tested with other 10 mm corrugated plastics, the 16 mm Reflexite (and similar heavier, stiffer substrates) may not. The 10 mm Reflexite can be used on stands were the heavier stiffer substrates listed above are acceptable.

As discussed above 10 mm Reflexite sign substrate material is acceptable for use on the NHS under the range of conditions specified, when proposed by a State.

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

- Our acceptance is limited to the crashworthiness characteristics of the devices and does not cover their structural features, or conformity with the Manual on Uniform Traffic Control Devices.
- 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-147 shall not be reproduced except in full. This letter, and the test documentation upon which this letter is based, is public information. All such letters and documentation may be reviewed at our office upon request.
- Reflexite Endurance sign material is 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,

Michael S. Griffith  
Acting Director, Office of Safety Design  
Office of Safety

Enclosures

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.