



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

March 22, 2005

400 Seventh St., S.W.  
Washington, D.C. 20590

In Reply Refer To: HSA-10/WZ-200

Mr. Marc Christensen  
Off the Wall Products, LLC  
P.O. Box 1461  
Salt Lake City, Utah 84110

Dear Mr. Christensen:

Thank you for your letter of January 28, 2005, requesting Federal Highway Administration (FHWA) acceptance of your company's MB-42 x 45 high-density polyethylene (HDPE) units as crashworthy traffic control devices for use in work zones on the National Highway System (NHS). Accompanying your letter were drawings of both the original and newly designed units and material specifications for them. You requested that we find the new devices acceptable by virtue of their similarity to the original units you had tested under the provisions of National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features." You asked that they be accepted as a Longitudinal Channelizing Barricade at test level 1 (TL-1) when linked together and as TL-3 Manual Uniform Traffic Control Devices Type II Barricades when they stand alone. You also followed up with additional information on March 10, 2005.

### **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 are those lightweight devices which are to be self-certified by the vendor, Category II devices are other lightweight devices which need individual crash testing but with reduced instrumentation, Category III devices are barriers and other fixed or heavy devices also needing crash testing with normal instrumentation, and Category IV devices are trailer mounted lighted signs, arrow panels, etc. for which crash testing requirements have not yet been established. 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 follows:

The original MB-48 x 40 (initially called MB-2) was a rotation molded hollow linear low-density polyethylene (LLDP) plastic barricade section which can accept water ballast. Each high impact, UV-resistant polyethylene section is 48 inches tall and 40 inches long. Each section is 23.5 inches wide at the base, tapering on one side to a top width of 6 inches. The wall thickness is 0.20 inches, and one section weighs 50 pounds empty.

This unit was tested and accepted as stand-alone Type II barricade units (FHWA acceptance letter WZ-8 dated February 5, 1999, TL-3). During the crash test, the plastic lens from the warning light broke loose and impacted the windshield, causing minor cracking.

Linked together, the units were also tested as a Longitudinal Channelizing Barricade (FHWA acceptance letter WZ-135, dated March 27, 2003, TL-1.) The test vehicles penetrated the system, as expected, but the vehicle trajectories were satisfactory and the occupant risk criteria were within acceptable limits. No parts of the LCB contacted the windshield.

The new MB-42 x 45 HDPE units are blow molded with HDPE and measure 40 inches long and 48 inches tall. Each section is 22.5 inches wide at the base, tapering on one side to a top width of 5 inches. The wall thickness is 0.156 inches and a single unit weighs 35 pounds when empty. The new units are 6 inches lower, 5 inches longer, and 15 pounds lighter than the tested units. The maximum water ballast that they can hold is 721 pounds, or 200 pounds less than the crash tested version. Because the tensile strength of the HDPE is significantly greater than that of the low density material, the wall thickness can be reduced using the HDPE and still maintain the strength of the units similar to the LLDPE crash-tested units.

### **Request and Findings**

You requested acceptance of the new MB-42x45 HDPE units as Test Level 3 stand-alone Type II barricades and as a TL-1 Longitudinal Channelizing Barricade just as the original MB-48 x 40 was tested. We concur in your request that the crash tests originally conducted, and documented in the FHWA acceptance letters WZ-8 and WZ-135 using the MB-48 x 40 are adequate to document satisfactory performance of the new MB-42x45 as Test Level 3 stand-alone Type II barricades and as a TL-1 Longitudinal Channelizing Barricade, respectively. As a stand-alone Type II barricade there is no greater potential for windshield contact at TL-3, and as an Longitudinal Channelizing Barricade (LCB) we see no greater likelihood of adverse vehicle trajectory or potential for greater occupant risk at TL-1.

The change in fabrication from a roto-molded product using low-density polyethylene (MB-48 x 40) to a blow-molded product using high-density polyethylene (MB-42 x 45) may affect the performance of the devices. The thinner HDPE walls of the new units are roughly 20 percent stronger than the thicker LLDPE walls in the tested units. You have arranged to have a TL-3 test (NCHRP Report 350 Test 3-10) conducted on the MD-42 x 45 HDPE LCB to assess the high-speed performance of the new units. Assuming the test is successful, you asked that the FHWA consider this test as sufficient to judge the TL-3 performance of the original MB-48 x 40 also. We agree in principal to this request, but reserve final judgment pending our analysis of the crash documentation to verify that performance will be comparable.

## Findings

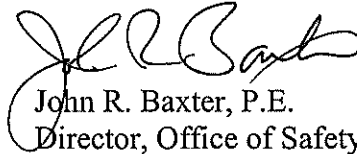
Based on the analysis above we concur that the new MB-42 x 45 HDPE units will be acceptable as TL-3 stand-alone Type II barricades and as a TL-1 LCB for use on the NHS under the range of condition that the MB-48 x 40 was tested, when proposed by a State.

Please note the following standard provisions that apply to the 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.
- 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 the FHWA and the NCHRP Report 350.
- To prevent misunderstanding by others, this letter of acceptance, designated as number WZ-200 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.
- Off-The-Wall Multi-Barrier units are patented devices 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 by a highway agency* for use on Federal-aid 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. These provisions do not apply to exempt non-NHS projects. Our regulations concerning proprietary products are contained in Title 23, Code of Federal Regulations, Section 635.411, a copy of which is enclosed.
- This acceptance letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented device for which the applicant is not the patent

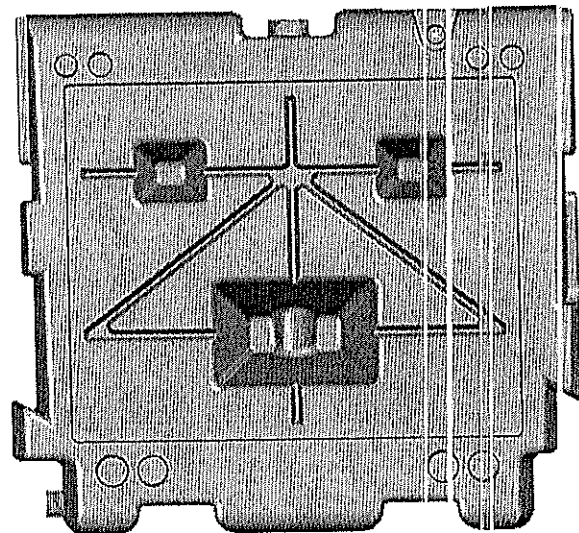
holder. The acceptance letter is limited to the crashworthiness characteristics of the candidate device, and the FHWA is neither prepared nor required to become involved in issues concerning patent law. Patent issues, if any, are to be resolved by the applicant.

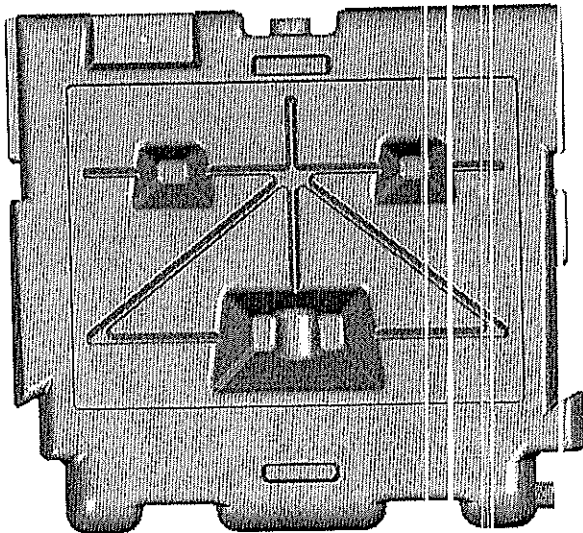
Sincerely yours,

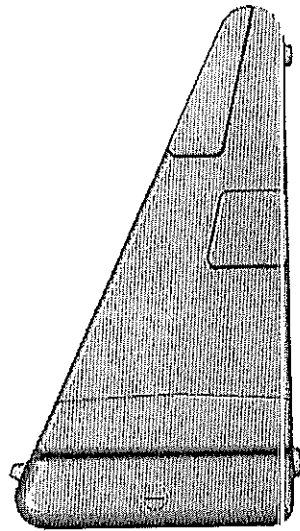
A handwritten signature in black ink, appearing to read "John R. Baxter". The signature is fluid and cursive, with the first name "John" and last name "Baxter" clearly distinguishable.

John R. Baxter, P.E.  
Director, Office of Safety Design  
Office of Safety

Enclosures







# Fortiflex® HDPE

## G50-100

Fortiflex® G50-100 is a high molecular weight, high density polyethylene copolymer developed for sheet extrusion, thermoforming and large part blowmolding where the finished product demands outstanding physical performance. This material meets the Food and Drug Administration requirements of 21CFR 177.1520. This resin is Kosher certified.


Property	ASTM Test Method	Typical Values	
		English Units	SI Units
Density	D 4883	—	0.950 g/cc
Melt Index <sup>1</sup>	D 1238	—	10.0 g/10 min
Tensile Strength			
@ Yield (2 in/min)	D 638	3800 psi	27.6 MPa
@ Break (2 in/min)	D 638	4400 psi	30.3 MPa
Elongation			
@ Break (2 in/min)	D 638	>800%	>800%
Tensile Modulus of Elasticity	D 638	135,000 psi	931 MPa
Flexural Modulus <sup>2</sup>	D 790	140,000 psi	965 MPa
Tensile Impact <sup>3</sup>	D 1822	250 ft-lb/in <sup>2</sup>	525 kJ/m <sup>2</sup>
Hardness (Shore D)	D 2240	65	65
Vicat Softening Point	D 1525	266°F	130°C
Brittleness Temperature	D 746	<113°F	<-75°C
Deflection Temperature @ 66 psi	D 648	167°F	75°C
Coefficient of Linear Thermal Expansion	D 698	0.00007 in/in/°F	0.00012 cm/cm/°C

(9/01/94)

<sup>1</sup> 190°C/21600 g<sup>2</sup> Tangent-Method 1<sup>3</sup> Type L

Solvay Polymers, Inc., 3333 Richmond Avenue, Houston, Texas 77098-3099 1-800-231-6313  
 Fax: 713/522-2435 Mailing Address: P.O. Box 27328, Houston, Texas 77227-7328  
 Technical Service: 1-800-338-0489 Customer Order Service: 1-800-527-5419

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# Solvay Polymers



A Passion for Progress®



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.