



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

February 28, 2007

400 Seventh St., S.W.
Washington, DC 20590

In Reply Refer To:
HSSD/WZ-249

Mr. Chris Goode
Vice President of Sales
Bone Safety Signs
2151 Northwest Parkway, SE - Suite 100
Marietta, GA 30067

Dear Mr. Goode:

Thank you for your November 6, 2006, correspondence requesting the Federal Highway Administration (FHWA) acceptance of your company's 3mm and 4mm thick Bone Light sign substrate. Accompanying your letter was a video recording of an informal crash test conducted. You requested acceptance of your Bone Light signs for use with accepted sign stands on the National Highway System (NHS) under the provisions of the National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

Upon request, you provided a sample of the Bone Light sign substrate to the FHWA and a copy of the product specifications. Your Bone Light sign substrate is a brand name of aluminum laminate material. The material properties of your 3mm and 4mm Bone Light substrate are identical and considered to be equivalent to other previously accepted 3mm and 4mm aluminum laminate sign substrates. Our records indicate that 3mm and 4mm aluminum laminate signs have been successfully crash tested on portable stands made by a number of manufacturers and are limited to use on the tested and accepted stands. Therefore, the FHWA accepts the use of your company's Bone Light 3mm and 4mm aluminum laminate sign substrates for use on the NHS under the range of conditions that equivalent materials have been tested and accepted, 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-249, 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.

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 blue ink, appearing to read "John R. Baxter".

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

Enclosures

BONE LIGHT[®] ACM SPECIFICATIONS

MANUFACTURER'S CERTIFICATIONS

ISO9001:2000 Quality Management System
Accredited by International Management Systems (IMS), USA



ISO14001:1996 Environmental Management System
Accredited by QS Zurich AG, Swiss



"Green Building Materials" Certificate
Issued by Organization for the Promotion of Energy Technologies
(OPET), EU



Bone Light[®] uses Kynar 500 PVDF, a paint manufactured out of polyfluorated resin, formulated with other metal micro-grains for color. Kynar 500 PVDF is weather resistant, chemical resistant, corrosive resistant and ultraviolet resistant to enable *Bone Light[®]* to maintain its color and texture for up to 20 years.

WARRANTY

10-Year Warranty Against Manufacturer's Defects

***Bone Light[®]* DIMENSION TOLERANCES**

Thickness ±0.12 mm

Bow Maximum 1.0 mm/m

NCHRP 350 COMPLIANCE

Bone Light[®] ACM is a generic equal to the 3MM and 4MM panels that have been tested and NCHRP-350 certified.

PHYSICAL AND MECHANICAL PROPERTIES

Properties	Unit	Test Value (4mm)	Test Value (3mm)	Test Standard
Aluminum Thickness	mm	0.50	0.25	-
Weight	kg/m ²	5.5	4.5	ASTM D-792
Tensile Strength	MPa	48	45	ASTM D-638
Yield Strength	MPa	44	43	ASTM D-638
Thermal Expansion (-20~60°C)	10 ⁻⁶ /°C	22.5	19.6	ASTM D-696
Temp. for Thermal Deformation	°C	113	106	ASTM D-648
Sound Transmission Coefficient	dB	26	24	ASTM E-413
Bending Strength	MPa	130	62	ASTM C-393
Bending Modules of Elasticity	10 ⁴ MPa	2.46	1.67	ASTM C-393
Penetrating Resistance	kN	10.5	5.24	ASTM D-732
Shearing Strength	MPa	32.5	23.1	ASTM D-732
180° Peel-off Strength	N/mm	12	7.5	ASTM D-903

COATING PROPERTIES

Properties	Test Method	Result
Coating Thickness	ISO2360	30 ± 2µm
Pencil Hardness	ASTM D-3363-92a	3H ~ 4H
Adhesion Dry Wet Boiling Water	ASTM D-3359 (Method 8) 37.8° C, 24 hrs 100° C, 20 min	No Change
Abrasion Resistance	ASTM D-968-63	No Change
Salt Spray Resistance (100% Salt Fog, 35° C, 3000 Hrs)	ASTM D-B117-90	No Change
Humidity Resistance (100% RH, 35° C, 3000 Hrs)	ASTM D-B2247-94	No Change
Chemical Resistance HCL H ₂ SO ₄ Mortar Detergent	ASTM D-1308-87 ASTM D-1308-87 AAMA 605.2-90 ASTM D-2248-93	No Change
Impact Resistance	ASTM D2794	No Change