



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

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

DEC 2 2005

In Reply Refer To: HSA-10/SS-131

Mr. Larry Leahy
President
Xcessories Squared
P.O. Box 135
Auburn, Illinois 62615

Dear Mr. Leahy:

Thank you for your letter of September 30, 2005, requesting the Federal Highway Administration (FHWA) acceptance of your company's "Kleen Break" sign post coupler as a breakaway system for use on the National Highway System (NHS). Accompanying your letter was a letter report from E-TECH Testing Services and videos of the pendulum tests. You requested that we find the Kleen Break sign post coupler acceptable for use on the NHS under the provisions of the National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features." On November 15, 2005, you submitted additional support from E-TECH regarding the expected performance when three posts are struck within a 2.1 m span.

Introduction

Testing of the supports was in compliance with the guidelines contained in the NCHRP Report 350, Recommended Procedures for the Safety Performance Evaluation of Highway Features. Requirements for breakaway supports are those in the American Association of State Highway and Transportation Officials' Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.

A brief description of the test article follows:

The "Kleen Break" (Model 425) Coupler consists of two ductile iron components, a top half and a bottom half joined together with a 5/8" – 11 UNC shear bolt using a lock washer, flange nut and a 80 durometer rubber bushing. The bottom end of the shear bolt is threaded to secure the assembled coupler to the anchor plate, while the top end of the bolt is threaded to receive the 5/8" flange nut, thus connecting the anchor and both halves of the coupler together. The 0.425" neck down of the bolt is now situated at the indexable seam of the top and bottom halves of the connector with the rubber bushing encasing the mid section of the bolt while



being compressed between the coupler halves (see drawing numbers 101303A and 101203A enclosed for reference). The sign post is then secured into the top half with a ductile iron-locking wedge that normally is still in place after impact. The serrated interlocking teeth allow for 360 degrees rotation of the sign post after the anchor is embedded.

For each tested sign post, the lower half of the support coupling was mounted to a 50.8 mm square 4.6 mm thick (7 ga) perforated tube ground anchor, and the upper half was placed on a 44.5 mm square 1.9 mm thick (14 ga) perforated tube support upright. The ground anchor was equipped with a 305 mm x 330 mm x 3.4 mm thick (10 ga) soil bearing plate and embedded in compacted the NCHRP Report 350 Standard Soil ("strong" soil.)

For the single post test the upright was outfitted with a 914 mm tall x 762 mm wide 2 mm thick aluminum sign. The base of the sign was a nominal 2134 mm above ground level. The support was torqued and locked according to the manufacturer's specifications. The mass of the support with sign was 12.7 kg. For the dual post test the uprights were fitted with a 1524 mm tall x 1219 mm side x 2 mm thick aluminum sign. The base of the sign was a nominal 2134 mm above the ground level. The supports were torqued and locked according to the manufacturers specifications. The mass of the support with sign was 31.6 kg.

Testing

Pendulum testing was conducted on your company's devices. The mass of the test bogie was 845 kg in both tests. The 10 stage crushable FOIL bogie nose was used. The complete devices as tested are shown in the enclosures.

| Test # | Speed | Version | Neck Diameter | Occupant Impact | Delta V |
|--------|----------|---------|--------------------|-------------------|----------|
| 1 | 35.0 kmh | Single | 10.8 mm (0.425 in) | None (no contact) | 0.29 m/s |
| 2 | 35.0 kmh | Dual | 10.8 mm (0.425 in) | None (no contact) | 0.58 m/s |

In both tests the remaining stub height was less than 30 mm.

Findings

The results of testing met the FHWA velocity change and stub height requirements and, therefore, the devices described above and shown in the enclosed drawings for reference are acceptable for use as Test Level 3 devices on the NHS under the range of conditions tested, when proposed by a State.

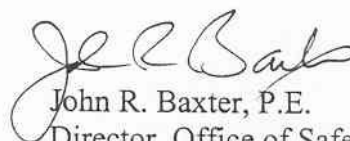
The pendulum test program tested single and dual supports. Because of the low velocity change you requested that the system be found acceptable when up to three posts within a span of 2.1 m are used to support a sign. We requested an engineering analysis to support that request and subsequently you provided E-TECH Testing Services' calculations. The E-TECH concluded that the dual and triple post systems would tend to rotate about their center of gravity. This means that the majority of the additional velocity change would be due primarily to the resistance of the couplers to breaking, and very little would be due to the additional mass of the 3-post system.

Their calculations showed the expected Delta V to be less than 1.0 m/s. Therefore, the Kleen Break system may be used with one, two, or three posts within a seven-foot span.

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 SS-131 shall not be reproduced except in full. As this letter and the supporting documentation which support it become public information, it will be available for inspection at our office by interested parties.
- The Kleen Break system is a patented device and is considered "proprietary." When 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. 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,



John R. Baxter, P.E.
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.