



U.S. Department
of Transportation

**Federal Highway
Administration**

May 9, 2006

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

In Reply Refer To:
HSA-10/SS-134

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

Dear Mr. Leahy:

Thank you for your January 31, 2006, letter requesting the Federal Highway Administration's (FHWA) acceptance of your company's "Redi-Torque" Model 280 Hardware Kit for use on your previously accepted breakaway slip base sign supports on the National Highway System (NHS). Accompanying your letter was a report from E-Tech Testing Services detailing pendulum tests of a dual post installation. You requested that we find the Redi-Torque system 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." You included three related requests:

- 1) Acceptance of three posts within a seven-foot span.
- 2) Acceptance for the Redi-Torque system with other slip base systems.
- 3) Modified top portion of the slip base, which is a 3x3-inch, 7 gage structural tube in place of the two angles to receive the 2-1/2" square steel tube sign support.

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.

The Xcessories Squared Slip Base for perforated square steel tube sign supports was initially accepted by the FHWA acceptance letter SS-68 on September 18, 1996. This letter has been the subject of nine previous modifications, SS-68A to SS-68I.



The Redi-Torque kit consists of 3 each 1/2" Grade 8, double head bolts that have a neck down area between the two hex heads of the bolt. The top hex is a 9/16" and the bottom is a 3/4" flange hex. This insures that the 9/16" socket or wrench used will not fit on the 3/4" hex. The neck down portion between the hexes is formed in the manufacturing process to allow a consistent break off of the top hex at the same foot-pounds of torque each time.

To further aid in friction reduction between the plates, 3 horseshoe shaped 3/16" Teflon coated steel washers were employed, one at each notch, between the plates. Teflon coated shim washers of the same shape with a 0.030 inch thickness are available for plumbing. A standard 1/2" inch washer is placed under the flange bolt head to allow for a proper torque to be achieved without premature separation of the top hex. The intent of this system is to allow installation without the use of special tools while ensuring that proper torque is achieved.

Testing

Pendulum testing was conducted on your company's devices. The mass of the pendulum test bogie was 845 kg in all tests. The complete devices as tested are shown in the Enclosures. The bases were installed with a stub height no greater than 4 inches.

Test #	NCHRP 350	Speed	Version	Occup. Speed	Delta V
1	3-60	35.0 kmh	Redi Torque, dual post	No Contact	0.55 m/s

Occup. Speed: Occupant Impact Speed: Speed at which a theoretical front seat occupant will contact the windshield. In meters per second.

Delta V: Speed change of the test vehicle, maximum allowable is 5.0 m/s.

Findings

Velocity changes were all within acceptable limits, and the stub was four inches or less, as designed. The results of testing met the FHWA requirements and, therefore, the device 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.

Our analysis of the three additional requests:

- 1) Acceptance of three posts within a seven-foot span. Three post extrapolation data from E-Tech was provided on February 1, 2006. It shows an estimated Delta V of 0.83 m/s. We concur in this request.
- 2) Acceptance for the Redi-Torque system with other slip base systems. The Redi-Torque bolts impart a much greater load than normally called for in conventional slip base designs. During a discussion with Mr. Nicholas Artimovich of my staff you indicated that the Redi-Torque bolts are designed to work as intended when used with the Teflon coated washers to reduce friction. In light of that, we will accept the use of Redi-Torque bolts in conventional slip base systems when the following conditions are met:

a. The Redi Torque bolts are only to be used with the complete hardware kit, comprised of bolt, slip washers, flat washers, and nut.

b. When the Redi torque kit is being used with square or rectangular slip plates with 4 bolts only 2 units may be used in a 7 foot span, and 3 units in 7 feet when using a 3 bolt pattern on triangular bases.

3) Modify the top portion of the slip base by using a 3x3-inch, 7 gage structural tube in place of the two angles to receive the 2-1/2" square steel tube sign support. The proposed system is more robust than the original tested system, and is considered acceptable.

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-134 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 Redi Torque bolt is a patented device and is considered "proprietary." When proprietary devices are *specified by a highway agency* for use on Federal-aid projects: (a) they 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.

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Sincerely yours,



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

Enclosures