



E-TECH Testing Services, Inc.
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November 11, 2003

Safe-Hit a Division of Energy Absorption Systems, Inc.
One East Wacker Drive 30th Floor
Chicago, Illinois 60601

To Whom It May Concern:

This letter is to confirm that E-TECH Testing Services, Inc. has successfully conducted impact testing on the Safe-Hit KonaPost flexible delineator post using the test criteria supplied by the manufacturer.¹ A total of five KonaPosts were impacted at 45 +/- 2 mph with a vehicle bumper 250 times without failure. The posts were then replaced and impacted over 225 times in a wheel-over condition in accordance with the specification without failure.² No problems were encountered with either the anchor installation or the post insert or removal.

E-TECH is a professional testing laboratory offering services primarily to highway design engineers, safety engineers, maintenance engineers, researchers, hardware developers, and others concerned with safety features used in the highway environment. E-TECH specializes in the analysis, testing, and evaluation of highway safety features. Testing and evaluation of safety features is conducted in strict accordance with nationally and internationally recognized procedures and standards. E-TECH is recognized by the Federal Highway Administration (FHWA) as a testing agency having significant experience in testing roadside safety features. E-TECH is accredited to ISO/IEC Guide 17025 "General Requirements for the Competence of Calibration and Testing Laboratories" by the American Association for Laboratory Accreditation which has a bilateral mutual recognition agreement with the European cooperation for Accreditation (A2LA Certificate 989.01). E-TECH's test measurements are traceable to the National Institute for Standards and Technology (NIST).

Sincerely,

John F. LaTurner, P.E.
Manager

Attachments

¹ Safe-Hit "Flexible Delineator Post Test Procedures" Doc No. 1200A00DPTR 10/20/03

² E-TECH Testing Services, Inc. Lab Test #336



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Lab Test Worksheet

Service Order # 1067

Lab Test # 336

Tested For Safe-Hit	Date 10/28/03	Tested By B. Terry
Description KonaPost Bumper and Wheel-Over Testing per Safe-Hit Test Specification 1200A00DPTR (see attached). Impact Vehicle 1990 Ford Festiva 1900 lb. Curb Weight	Part Number KonaPost	Test Type Flexible Delineator
Purpose 45 +/- 2 mph bumper and wheel-over impacts until failure. Record number of impacts at failure.		Requested By J. Thompson
Test Article Description Safe-Hit KonaPost Model No. SHLG19GPR--YX (POST, DELINEATOR, HEAVY DUTY, 4X19, W/STEM)		

Trial Number	Descriptions / Observations	By / Date / Time
N/A	Installed (5) KonaPost bases per supplied instructions. No problems with installation. Ambient temperature 86 deg F, epoxy hardened in less than one hour.	CR 10/24/03 9:35 AM
Start Bumper Test	Bumper impacts at 45 mph. Temp at start 79 deg F.	BMT 10/28/03 9:20 AM
Stop	Car breakdown at hit 92. Posts in good condition. Temp 93 deg F.	BMT 10/28/03 1:45 PM
Resume	Car fixed, resume testing.	BMT 10/28/03 2:00 PM
Stop	Hit 125, done for day. Posts in good condition, no failure.	BMT 10/28/03 2:30 PM
Resume	Resume testing. Temp 81 deg F.	BMT 10/29/03 9:30 AM
End Bumper Test / Start Wheel-over	250 bumper hits, no failures. Replace KonaPosts with new ones.	BMT 10/29/03 11:00 AM
Stop	Done for day, 100 wheel-over.	BMT 10/29/03 2:00 PM
Resume	Resume wheel over testing. Temp 50 deg F.	BMT 10/31/03 9:00 AM
End Wheel-over Testing	Wheel-over hit 234. Post number 5 failed, crack ¾ around circumference.	BMT 10/31/03 11:30 AM

Conclusions, Comments: 250 bumper impacts no failure, 234 wheel-over with only 1 out of 5 posts failed. No installation problems or other performance problems.



KonaPost™ Test Procedures

GENERAL REQUIREMENTS

The flexible surface mounted delineator post shall:

- meet all requirements as set forth in the latest edition of the Manual on Uniform Traffic Control Devices (MUTCD) as pertaining to such device.
- include the appropriate receptacle, or anchor, as recommended by the manufacturer.

The Manufacturer shall:

- furnish to the testing agency ten flexible surface mounted delineator posts (KonaPosts) with the appropriate anchor and epoxy kit required to properly install such anchor.
- install the anchors and posts in accordance with the KonaPost Installation Instructions.
- furnish the testing agency with information on the composition of the post, anchor, and epoxy provided.

TEST PROCEDURE

A sample size of ten test articles shall be tested as follows:

Bumper impact test

Five KonaPosts shall be impacted at 45 +/- 2 mph by a standard sedan with a bumper height of approximately 18 inches. The test samples shall be impacted 225 times, or until failure, with the test vehicle bumper near the headlight. Failure is defined as crack 2" in length, extending one-half way around the circumference of the post stem, allowing the post to hinge below the base and not remain upright in the receptacle. The number of impacts for each post and/or mean number of impacts to failure shall be recorded. Test vehicle make and model, weight, and ambient temperature are also to be recorded. A sampling of the impacts will be recorded on standard VHS video, and the test articles shall be photographed upon completion of the test.

Wheel-over impact test

Upon completion of the bumper impact test, the test samples shall be removed and five new KonaPosts shall be installed in the same receptacles and impacted 225 times at 45 +/- 2 mph in a wheel-over test condition. The wheel-over test will be documented in the same manner as described above for the bumper impact test condition.



TEST OBSERVATIONS

The testing agency will inspect each post periodically during and after each impact condition and document the following:

1. Any splits, cracks, breaks, or other forms of deformation or distress.
2. Bonding agent used to install the receptacles in the roadway surface and any problems or comments regarding the performance of the anchors and/or epoxy.
3. Any problems or comments associated with the installation and removal of the posts.
The testing agency will document any special equipment or techniques required to install or remove the posts or anchors.
4. Any other problems or comments associated with the performance of the KonaPost, which would be of interest to the end user.