



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

OCT 27 1995

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

Refer to: HNG-14

Mr. Clifford M. Dent
P.O. Box 1119
Mile 16.5 North Road
Kenai, Alaska 99611

Dear Mr. Dent:

Thank you for your September 28 letter to Mr. William A. Weseman requesting Federal Highway Administration's (FHWA) acceptance of your breakaway sign support coupling. Transmitted with you letter were two reports of pendulum testing conducted by the Southwest Research Institute (dated September 1995) and a video of the tests.

Requirements for breakaway supports are found in the American Association of State Highway and Transportation Officials (AASHTO) Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals. These specifications have been adopted by the FHWA. The testing was done in conformance with the guidelines in the National Cooperative Highway Research Report Number 350, Recommended Procedures for the Safety Performance Evaluation of Highway Features.

The tested sign support systems consisted of 3280-mm long steel poles welded to 257-mm diameter base plates. Four galvanized ASTM A325-strength steel breakaway connectors (see enclosed drawings) were used to attach a pole's round base plate to the test fixture. The top of the test fixture anchor plate was approximately 50 mm above the nominal groundline. The rigid foundation at the test facility simulated a concrete foundation. The pole and couplings were different for each of the two tests.

An 816-kg pendulum fitted with a 10-stage crushable nose, with a striking height of 457-mm above the groundline, was used to simulate an impacting automobile. Additional hardware and test details and results are presented in the following table:

Test Number	CO-4	CO-5
Pole (side or diameter)	127 mm square	127 mm round
Pole (steel specification)	ASTM A 500 Gr B	ASTM A 53
Pole wall thickness	4.76 mm	Schedule 40 (6.55 mm)
Coupling diameter	15.9 mm (5/8-inch)	13.0 mm (1/2-inch)
Diameter of grooved section	9.65 mm	7.11 mm
Base plate thickness	15.875 mm (ASTM A 36)	15.875 mm (ASTM A 36)
Base plate hole diameter	19.1 mm	19.1 mm
Base plate overall diameter	257 mm	257 mm
Base bolt circle	220 mm	220 mm
Mass of test object	70.8 kg	70.8 kg
Impact speed	35.28 km/h	35.28 km/h
Velocity change	4.5 m/s	1.5 m/s
Occupant impact	none	none
Calculated high-speed (100 km/h) velocity change	3.2 m/s	2.2 m/s
Stub height	12 mm*	12 mm*

* The stub height was measured above the test installation anchor plate. In actual installations, the height of the top of the anchor plate must be kept low enough so that the stub of the connector does not project more than 100 mm above a 1500-mm chord.

These results meet the change-in-velocity and stub height requirements adopted by the FHWA and the AASHTO. Therefore, your breakaway sign support couplings described above and illustrated in the enclosures are acceptable for use on the National Highway System within the range of conditions tested, if requested by a state. The following conditions and limitations also apply unless further crash testing indicates acceptability under other conditions:

1. No more than one sign support may be used within a 2.1-meter width.
2. All supports shall be mounted to a structural concrete foundation that will not move in the soil if the support is struck by a vehicle.
3. The support post for use with the 15.9-mm (5/8-inch) couplings must have a moment capacity at least as great as the tested post and a support post used with the 13.0-mm (1/2-inch) couplings must have a moment capacity at least as great as 60 percent of that of the tested post.
4. The bolt circle must be no greater than 220 mm.

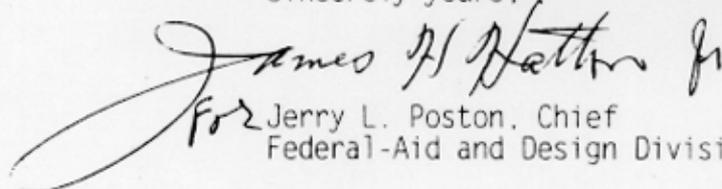
5. The couplings may be used in a three-bolt pattern, subject to the conditions cited, but may not be used with inclined slip bases.

If you decide to conduct further crash testing of breakaway sign supports with your couplings, the use of a rigid mounting frame to simulate the anchor plate of a field installation will not be acceptable. The foundation should be constructed in soil in close conformity with the plans and specifications that you intend to be used in actual installations.

Our acceptance is limited to the breakaway characteristics of your couplings and does not cover their structural features. Presumably, you will supply potential users with sufficient information on structural design and installation requirements to ensure proper performance. We anticipate that the states will require certification that the hardware furnished will have essentially the same chemistry, mechanical properties, and geometry as that used in the tests and that it will meet the FHWA change in velocity requirements.

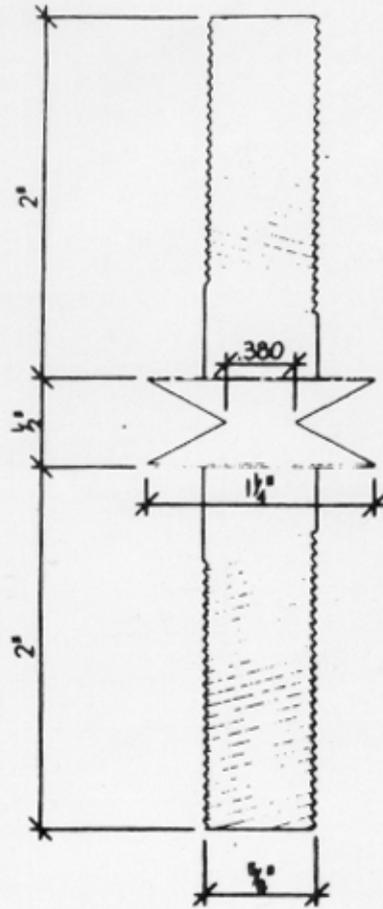
Because your breakaway couplings are proprietary, to be used in Federal-aid highway projects, except exempt, non-NHS projects: (a) they must be supplied through competitive bidding with equally suitable unpatented items, or (b) the highway agency must certify that they are essential for synchronization 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.

Sincerely yours,


For Jerry L. Poston, Chief
Federal-Aid and Design Division

3 Enclosures

U.S. Patent No. 4,923,319
BREAKAWAY CONNECTOR
1989 Clifford M. Dent

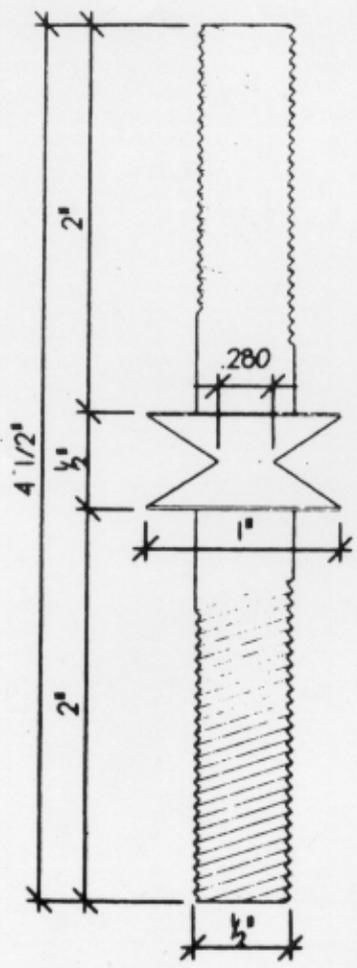


5/8" DIAMETER BOLT

Full Scale

Figure 2. Manufacturer's Drawing of Test Article

U.S. Patent No. 4,923,319
BREAKAWAY CONNECTOR
1989 Clifford M. Dent



1/2" DIAMETER BOLT

~~Full Scale~~

Figure 2. Manufacturer's Drawing of Test Article
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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.