

QUEST™ System

GENERAL SPECIFICATIONS

I. GENERAL

All QUEST Systems shall be designed and manufactured by, or under the direction of, Energy Absorption Systems, Incorporated, of Chicago, Illinois.

II. DESCRIPTION OF SYSTEM

A. General

The QUEST System is a non-gating redirective terminal and crash cushion that has been crash tested at Test Level 3 (100 km/h) according to recommendations in the National Cooperative Highway Research Program Report 350 (NCHRP 350)¹. The QUEST System shall consist of two front anchor assemblies, a nose assembly containing an integrated trigger assembly, two shaper rail assemblies, a support frame assembly with two energy absorbing tube shapers, a diaphragm assembly, a bridge assembly, energy absorbing W-beam fender panel assemblies which can telescope rearward during head-on impacts, two rear rails, and a freestanding backup assembly which includes two rear shapers. The system of front anchors, shaper rails, rear rails, backup, W-beam fender panels, diaphragm and bridge shall resist lateral movement during side angle impacts, and the above, along with the nose assembly will attenuate rearward movement during head-on impacts. Transitions are available and may be required depending on the hazard being shielded.

B. Material Specifications

1. The w-beam panel material designation shall be the industry standard AASHTO M180 Class A (12ga).
2. The rail and diaphragm tubing material and wall thickness designation shall be per ASTM A500 GR B.
3. The nose and diaphragm sheet metal material and thickness designation shall be per ASTM A569.
4. All other flat bar or plate steel specification shall be per ASTM A36.

¹ Transportation Research Board. "Report 350 Recommended Procedures for the Safety Performance Evaluation of Highway Features" Washington, D.C.: National Academy of Sciences, 1993

5. The fasteners at the anchor/rail connection are specified as SAE J429 GD 8 and all others as SAE J429 GD 5.
6. All steel components are specified hot dipped galvanized after fabrication per ASTM A123.
7. All welding shall be done by or under the direction of a certified welder.

III. PERFORMANCE CRITERIA

- A. For head-on impacts into the nose, the QUEST™ System shall be capable of meeting the occupant risk criteria as recommended in NCHRP 350. For vehicles weighing between 820 and 2000 kg [1,810 and 4,410 lbs], the theoretical impact velocity of a hypothetical front seat passenger against the vehicle's interior (calculated from vehicle acceleration and 600mm [24"] forward displacement) shall be less than 12m/s [39.4 ft/sec], and the vehicle's highest 10 millisecond average acceleration subsequent to the instant of the hypothetical passenger impact shall be less than 20 G's.
- B. The QUEST System shall be capable of redirecting 2000 kg [4,410 lbs] vehicles which impact the sides of the system at speeds up to 100 km/h [62 mph] at angles of 20° for both right-way and wrong-way impacts (angles measured from system's longitudinal centerline). The QUEST System shall be capable of redirecting 820 kg [1,810 lbs] vehicles, which impact the sides of the system at speeds up to 100 km/h [62 mph] at angles of 15°. (See Test Criteria below.)
- C. The QUEST System shall be designed and constructed so that there is no debris released from the system which can create a hazard on the roadway after either head-on or side angle design impacts.

IV. TEST CRITERIA

The QUEST System shall have been fully tested per the recommended eight test matrix and corresponding evaluation criteria set forth in National Cooperative Highway Research Program (NCHRP) Report 350, 1993, Test Level 3 for redirective, non-gating terminals and crash cushions.

V. **DESIGN AND SELECTION CRITERIA**

- A. Design, selection and placement of crash cushions shall conform to The American Association of State Highway and Transportation Officials (AASHTO) Publication, "Roadside Design Guide" 2002.
- B. Installation of the QUEST System attenuators shall be accomplished in accordance with the recommendations of Energy Absorption Systems, Incorporated.