

## **TRITON BARRIER® TL-3 GENERAL SPECIFICATIONS**

### **I. GENERAL**

- A. The TRITON BARRIER TL-3 (TRITON TL-3) shall be a highly portable and crashworthy longitudinal barrier especially suited for use as a temporary barrier in highway construction zones. When assembled as specified by the manufacturer, the components of the TRITON TL-3 shall also provide an integral crashworthy end treatment.
- B. The TRITON TL-3 shall provide a portable traffic control and positive protection system.
- C. All elements, components, and subassemblies of the TRITON TL-3, as well as optional accessories, shall be designed, manufactured, and/or supplied by Energy Absorption Systems, Inc., of Chicago, Illinois.

### **II. DESCRIPTION OF THE SYSTEM**

- A. An installation of the TRITON TL-3 shall be constructed from a series of individual “**segments**”.
- B. Each “**segment**” shall be composed of the following:
  - 1. One barrier section.
    - a) Each barrier section shall be constructed of a lightweight, recyclable, virgin linear low density polyethylene plastic shell, with UV stabilizers and antioxidants, designed to accept water ballast.
    - b) The approximate physical dimensions and capacities of the sections shall be: length (pin to pin) 1981 mm [78 in.]; width: 533 mm [21 in.]; height: 813 mm [32 in.]; empty weight: 64 kg [140 lb.]; full weight: 612 kg [1350 lb.]; water ballast: 549 liters [145 gallons].
    - c) Barrier sections shall be constructed in white or workzone safety orange colors for high visibility.

- d) Each barrier section shall include an internal galvanized steel framework to provide additional rigidity during handling and impacts, and shall be equipped with a 12.7 mm [1/2 in.] diameter galvanized steel cable along a recess in the top of the section, for suitable tensioning capability.
  - e) The ends of each barrier section shall be constructed with vertically aligned knuckles which interlock with those of adjacent sections and which accept a 51 mm [2 in.] dia. steel connecting pin. The connecting pin shall be constructed to securely connect adjoining sections and their respective tension cables for suitable impact performance.
  - f) Each barrier section shall be constructed with ribbed sidewalls to interact with an impacting vehicle in a manner that resists penetration, vaulting, and underriding.
  - g) Each barrier section shall be constructed with elevated forklift openings to allow for mechanical lifting when empty or full.
  - h) Each barrier section shall be constructed with two 127 mm [5 in.] diameter quick fill openings with covers, and a 38 mm [1 1/2 in.] diameter rapid release gate valve to allow quick draining of the water ballast. A reflectorized fill level indicator shall be constructed in the top of each section to allow quick verification that the section is adequately full of water ballast.
2. One TRITON BARRIER® TL-3 Kit. Each TRITON BARRIER TL-3 Kit shall include:
- a) Two pedestals.
    - (1) Each pedestal shall be constructed of a lightweight, recyclable, virgin or recycled, linear low density polyethylene plastic shell, with UV stabilizers and antioxidants, and shall be black in color.

- (2) Each pedestal shall be designed so that two pedestals will support the weight of one barrier section that is full of water ballast.
  - (3) The approximate physical dimensions and capacities of each pedestal shall be: length 787 mm [31 in.]; width: 419 mm [16.5 in.]; height: 229 mm [9.0 in.]; weight: 3.2 kg [7 lb.].
  - (4) Each pedestal shall be constructed to support a barrier section at a height elevated approximately 175 mm [7 in.] above ground level.
  - (5) Each pedestal shall be constructed with slots cut in its upper surface in order to receive a strap by which the pedestal shall be attached to a barrier section.
  - (6) Pedestals shall be constructed to nest when stacked to reduce shipping and storage space.
- b) Two strap assemblies.
- (1) Each strap assembly shall include one galvanized steel strap 32 mm [1.25 in.] in width and approximately 1.19 m [47 in.] in length, and a galvanized 3/8" hex head bolt, hex nut and washers.
- c) Four galvanized hex nuts (1/2"-13 UNC).
- (1) The galvanized hex nuts shall be used to double-nut the attachment of each of the two existing U-bolts to the internal frame within each barrier.

### **III. PERFORMANCE CRITERIA**

- A. The TRITON BARRIER TL-3 shall be fully tested to, and shall meet the recommended structural adequacy, occupant risk, and vehicle trajectory criteria set forth in the National Cooperative Highway Research Program Report 350 (NCHRP-350) when properly installed according to the manufacturer's recommendations.
1. **The minimum length of an installation of TRITON BARRIER® TL-3 shall be thirty (30) segments.**
  2. **The length of need (LON) for any installation of TRITON BARRIER® TL-3 shall begin at the 11<sup>th</sup> segment from the end of the installation.**
  3. Within the length of need (LON), as defined in NCHRP-350, the TRITON TL-3 shall meet the criteria for Test Level 3 (TL-3) impact conditions for 820 kg and 2000 kg [1808 and 4409 lb.] vehicles at speeds of 100 km/h [62 mph].
  4. When assembled as specified by the manufacturer, the components of the TRITON TL-3 shall provide an integral end treatment for the installation. This end treatment shall meet the criteria for an NCHRP-350, TL-3, Non-Redirective Crash Cushion for impact conditions involving vehicles of 820 kg and 2000 kg [1808 and 4409 lb.] at a speed of 100 km/h [62 mph].
- B. For TL-3 LON impacts, the TRITON TL-3 shall be capable of preventing vehicle penetration, vaulting, and underriding, and shall bring the impacting vehicle to a controlled stop in the vicinity of the impact area, or for shallow angle impacts shall redirect the vehicle, while undergoing controlled lateral deflection. For typical lateral deflection, see TRITON BARRIER® TL-3 Limitations and Warnings, found in the TRITON BARRIER TL-3 Manual.
- C. For TL-3 LON impacts, detached debris shall not show potential for penetrating the vehicle occupant compartment or presenting a hazard to other traffic, pedestrians, or workers in a work zone.
- D. For TL-3 LON impacts, a vehicle impacting the TRITON TL-3 shall remain upright during and after the collision though moderate roll, pitch, and yaw may occur.

- E. Following TL-3 LON impacts, the intrusion of the vehicle's trajectory into adjacent traffic lanes shall be minimized.
- F. For a TL-3 LON impact by a 2000 kg light truck, the theoretical longitudinal impact velocity of an unrestrained front seat passenger upon impact with the interior of the vehicle shall be no more than 12 m/s [39.3 ft/s]. That theoretical longitudinal occupant impact velocity shall be calculated from the measured acceleration history of the vehicle during impact, and shall be determined at the instant the passenger has moved forward 600 mm [23 5/8 in.] relative to the vehicle.
- G. For a TL-3 LON impact by a 820 kg automobile, the theoretical longitudinal impact velocity of an unrestrained front seat passenger upon impact with the interior of the vehicle shall be no more than 12 m/s [39.3 ft/s]. That theoretical longitudinal occupant impact velocity shall be calculated from the measured acceleration history of the vehicle during the impact, and shall be determined at the instant the passenger has moved forward 600 mm [23 5/8 in.] relative to the vehicle.
- H. For a TL-3 LON impact by a 820 kg automobile, the theoretical lateral impact velocity of an unrestrained front seat passenger upon impact with the interior of the vehicle shall be no more than 12 m/s [39.3 ft/s]. That theoretical lateral occupant impact velocity shall be calculated from the measured acceleration history of the vehicle during the impact, and shall be determined at the instant the passenger has moved laterally 300 mm [1 ft.] relative to the vehicle.
- I. For TL-3 LON impacts into the TRITON TL-3, the highest 10 ms average vehicle accelerations in the longitudinal and lateral directions (with respect to the vehicle), subsequent to the instant of occupant impact with the vehicle interior as defined by NCHRP-350, shall be less than 20G.

#### **IV. DESIGN AND SELECTION CRITERIA**

- A. Design, selection, and placement of the TRITON TL-3 should conform with applicable guidelines in:
  - 1. U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices", Washington, D.C. U.S. Government Printing Office, 1988 and all subsequent revisions.
  - 2. American Association of State Highway and Transportation Officials, "Roadside Design Guide", Washington, D.C. AASHTO, January 1996 and all subsequent revisions.
  
- B. Installation of the TRITON TL-3 with or without end treatment shall be accomplished in accordance with the recommendations of Energy Absorption Systems, Inc., in the TRITON BARRIER® TL-3 installation manual and application manual.