

CushionWall® II

General Specifications

I. GENERAL

All CushionWall II systems shall be manufactured by Energy Absorption Systems, Inc. of Chicago, Illinois.

II. DESCRIPTION OF SYSTEM

A. General

The CushionWall II is a reusable longitudinal barrier made from a single row of cylinders that have the ability to recover a major portion of their shape, position, and capabilities after being impacted.

The CushionWall II for Test Level 2 Length Of Need (TL-2 LON) conditions, as specified by the National Cooperative Highway Research Program (NCHRP) Report 350 is a multiple cylinder, single row, redirective longitudinal barrier. The CushionWall II shall incorporate High Molecular Weight, High-Density Polyethylene (HMW/HDPE) or “smart plastic” cylinders as the energy absorbers. The CushionWall II shall be restrained from longitudinal movement by the anchoring hardware of the cylinders and the concrete wall, as well as the adjacent cylinders. The CushionWall II shall measure 1.22 m [48"] tall and 610 mm [24"] deep. The number of cylinders comprising a full CushionWall II shall depend upon site configuration and length. The minimum recommended Length Of Need (LON) is 9.75 m [32'] consisting of 16 cylinders.

B. Component Description

1. The CushionWall II shall consist of High-Density Polyethylene (HDPE) cylinders. Each cylinder is 610 mm [24"] in diameter and 1.22 m [42"] in height.
2. The CushionWall II shall incorporate “U” shaped steel brackets, which join the cylinders together. The brackets extend to the ground and support the cylinders vertically. This bracket eliminates potential cylinder sag and aids in alignment during installation.

C. Material Specifications

1. All structural steel and energy absorbing materials in the CushionWall II shall be new and domestically manufactured.

2. Metal work shall be fabricated from ASTM A-36 steel. After fabrication, metal work shall be galvanized in accordance with ASTM A-123. All welding shall be done by or under the direction of a certified welder.
3. The system shall be assembled with galvanized fasteners. All bolts, nuts and washers shall be Commercial Quality “American National Standard” unless otherwise specified.

D. Maintenance

The CushionWall II is considered to be a reusable crash cushion, but must be inspected after each impact. Consult the “Maintenance and Repair” section of the Installation Manual for a more detailed discussion. All cylinders require replacement when the minor axis of the cylinder measures 460 mm [18"] or less, one week after the last impact. Except for impact damage, it's anticipated that the plastic cylinders will survive in a highway environment for a period ranging from 5 to 15 years from the date of installation.

III. TEST CRITERIA

- A. The CushionWall II with 16 cylinders has successfully passed the NCHRP 350 Test Level 2 (TL-2) tests with both the light car and pickup truck at speeds up to 70 km/h [44 mph] at angles up to 25 degrees. NCHRP TL-2 for longitudinal barrier specifies the following evaluation criteria:

NCHRP 350 Evaluation Criteria

1. A longitudinal barrier should be capable of meeting the Occupant Risk Criteria as recommended in NCHRP 350. For vehicles weighing between 820 kg [1,808 lbs.] at 20 degrees and 2000 kg [4,409 lbs.] at 25 degrees, the theoretical impact velocity of a hypothetical front seat passenger against the vehicle's interior (calculated from vehicle acceleration and 610 mm [24"] forward displacement) should be less than 12 m/s [39.4 ft/sec], and the vehicle's highest 10 millisecond average acceleration subsequent to the instant of the hypothetical passenger impact should be less than 20 G's.
2. A longitudinal barrier should be capable of redirecting 2000 kg [4,410 lb.] vehicles that impact the sides of the system at speeds up to 70 km/h [44 mph] at angles up to 25 degrees. At angles up to 20 degrees, a longitudinal barrier should be capable of redirecting 820 kg [1,810 lb.] vehicles that impact the System at speeds up to 70 km/h [44 mph] at angles up to 20 degrees.

3. A longitudinal barrier should be designed and constructed so no solid debris is present from the System that can create a hazard on the roadway after design impacts.
- B. Impact conditions that differ from those described in the NCHRP Report 350 test matrix for longitudinal barrier may result in different crash results than those encountered in testing. Furthermore, impacts in excess of TL-2 impact severity or the existence of unusual impact conditions such as vehicle instability resulting from traversing curbs of excessive cross slopes prior to impact may compromise crash performance. Under these conditions, performance criteria relative to structural adequacy, occupant risk and vehicle trajectory may not meet NCHRP 350 evaluation criteria.

IV. STRUCTURAL BACKING

The vertical backup wall must be capable of resisting the imposed forces transferred through the CushionWall II during impact. The loads will be determined from the design criteria, i.e. design velocity, impact angle, and vehicle weight. The backup wall may be reinforced concrete structure or a rigidly braced steel structure.

V. DRAWING SITE DATA

Engineering drawings shall be prepared by the manufacturer and submitted to the client for approval. All designs and drawings shall be based on design criteria specified by the client. Proposal and assembly drawings shall be submitted upon the client's request.

VI. FIELD INSTALLATION

Installation of the CushionWall II shall be accomplished in accordance with the recommendations of Energy Absorption Systems, Inc.