



# Standard Specification for Precast Concrete Barriers<sup>1</sup>

This standard is issued under the fixed designation C 825; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This specification covers precast concrete barriers, intended to be used adjacent to a roadway or as a median, to redirect vehicles unintentionally leaving the roadway.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

## 2. Referenced Documents

### 2.1 ASTM Standards:

- A 82 Specification for Steel Wire, Plain, for Concrete Reinforcement<sup>2</sup>
- A 185 Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement<sup>2</sup>
- A 416/A416M Specification for Steel Strand Uncoated Seven-Wire for Prestressed Concrete<sup>2</sup>
- A 421 Specification for Uncoated Stress-Relieved Steel Wire for Prestressed Concrete<sup>2</sup>
- A 496 Specification for Steel Wire, Deformed, for Concrete Reinforcement<sup>2</sup>
- A 497 Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement<sup>2</sup>
- A 615/A615M Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement<sup>2</sup>
- A 616/A616M Specification for Rail-Steel Deformed and Plain Bars for Concrete Reinforcement<sup>2</sup>
- A 617/A617M Specification for Axle-Steel Deformed and Plain Bars for Concrete Reinforcement<sup>2</sup>
- C 31 Practice for Making and Curing Concrete Test Specimens in the Field<sup>3</sup>
- C 33 Specification for Concrete Aggregates<sup>3</sup>
- C 39 Test Method for Compressive Strength of Cylindrical Concrete Specimens<sup>3</sup>
- C 42 Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete<sup>3</sup>
- C 150 Specification for Portland Cement<sup>4</sup>
- C 173 Test Method for Air Content of Freshly Mixed

Concrete by the Volumetric Method<sup>3</sup>

C 231 Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method<sup>3</sup>

C 260 Specification for Air-Entraining Admixtures for Concrete<sup>3</sup>

C 309 Specification for Liquid Membrane-Forming Compounds for Curing Concrete<sup>3</sup>

C 330 Specification for Lightweight Aggregates for Structural Concrete<sup>3</sup>

C 494 Specification for Chemical Admixtures for Concrete<sup>3</sup>

C 595/C595M Specification for Blended Hydraulic Cements<sup>4</sup>

C 618 Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete<sup>3</sup>

## 3. Classification

3.1 Precast concrete barriers manufactured in accordance with this specification shall be as shown in either Fig. 1 or Fig. 2.

## 4. Basis of Acceptance

4.1 Precast barrier shall comply with all of the provisions of this specification and shall be tested as prescribed in 8.3 and 8.4.

4.1.1 *Acceptance as to Strength Properties*—Concrete barrier shall be acceptable under the strength tests when the sections have met the requirements of Section 8.

4.1.2 *Acceptance as to Dimensional Properties*—Concrete barrier shall meet the dimensional tolerances of Section 9.

4.1.3 *Acceptance as to End Result*—The concrete barrier sections shall be finally acceptable to the purchaser at the designated point of delivery with no significant cracking. Significant cracking is defined as fractures or cracks passing through the section or any continuous structural crack extending for a length of 12 in. (305 mm) or more, regardless of position in the section.

## 5. Materials

5.1 *Cement*—Portland cement shall conform to the requirements of Specification C 150 or shall be portland blast-furnace slag cement or portland-pozzolan cement conforming to the requirements of Specification C 595.

5.2 *Aggregates*—Aggregates shall conform to Specification C 33 or C 330.

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee C-27 on Precast Concrete Products and is the direct responsibility of Subcommittee C27.20 on Architectural and Structural Products.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 01.04.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 04.02.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 04.01.

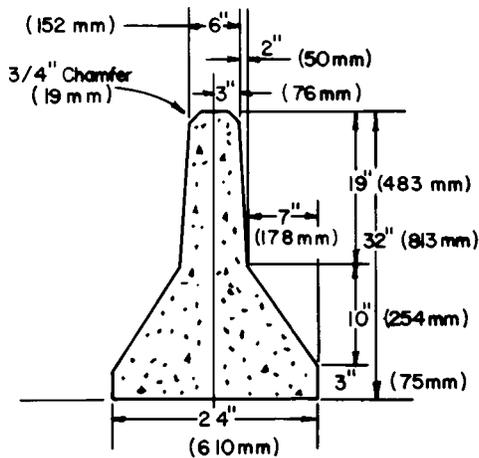


FIG. 1 New Jersey Barrier

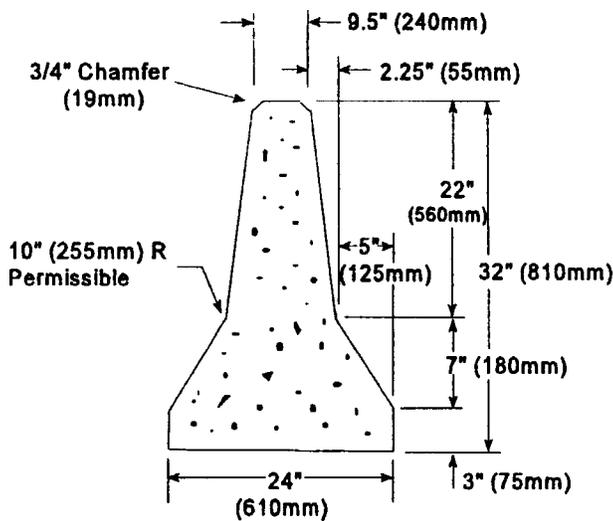


FIG. 2 Type-F Barrier

5.3 *Admixtures*—Admixtures may be used with the approval of the purchaser. Air-entraining admixtures shall conform to Specification C 260. Chemical admixtures shall conform to Specification C 494. Fly ash or other pozzolanic admixtures shall conform to Specification C 618. Admixtures containing chlorides shall not be used in the manufacture of prestressed barrier sections.

5.4 *Steel Reinforcement*—Steel reinforcement shall consist of wire fabric conforming to Specifications A 185 or A 497, or of wire conforming to Specifications A 82, A 421, or A 496, or of strand conforming to Specification A 416, or of bars conforming to Specifications A 615/A 615M, A616/A 616M, or A617/A 617M.

## 6. Design

6.1 Precast concrete barrier shall be as defined in Section 3.

6.2 *Concrete Strength*—Concrete for barrier sections shall have a design compressive strength of 4000 psi (28 MPa) in 28 days.

6.3 *Air Entrainment*—Unless otherwise specified by the purchaser, all concrete shall have an air content of  $5\frac{1}{2} \pm 1\%$  as measured by Test Methods C 173 or C 231.

6.4 *Dimensions*—Cross-sectional dimensions of the barrier shall be as shown in Fig. 1. Unless otherwise specified by the purchaser, the length of each barrier section shall be a minimum of 10 ft (3 m).

6.5 *Steel Reinforcement*—Unless designated by the purchaser, steel reinforcement shall be designed by the producer and shall be sufficient to permit handling, delivery, and placement of the sections without damage. The producer shall provide steel reinforcement details to the purchaser. The design cover of concrete over reinforcing steel shall be a minimum of 2 in. (50 mm). Unless prestressing is used, reinforcement shall be assembled as a cage utilizing any combination of single or multiple layers and mats containing sufficient longitudinal bars or wire extending through the section to maintain the shape and position of reinforcement within the form during placement of the concrete. The exposure of the ends of longitudinal reinforcement in the barrier shall not be a cause for rejection.

NOTE 1—The purchaser or producer, or both, of the precast concrete barrier specified herein is cautioned that he should design reinforcing for the ends of barrier sections in accordance with the publication “Concrete Median Barrier Research,” Vol. 2, Research Report, prepared by the Southwest Research Institute for the Federal Highway Administration, to prevent fracture at the joints.

6.6 *Reinforcement Laps, Welds, and Splicing*—All splices shall be acceptable to the purchaser and shall develop the full strength of the reinforcing.

6.7 *Concrete Finish*—Concrete finishing shall be at the option of the producer and shall produce a finish comparable to a steel form finish. The concrete finish and curing of all median barrier sections shall be uniform for all sections included in the contract lot.

6.8 *Lifting Devices*—Should the producer cast lifting devices into the barrier sections, they shall not be on the side surfaces.

6.9 *Anchorage*—Anchorage to prevent lateral movement of the barrier shall consist of dowels, keyway joints, or interlocking devices as may be specified by the purchaser.

## 7. Manufacture

7.1 *Mixture*—The constituent materials shall be proportioned and thoroughly mixed to produce a uniform concrete mixture of such quality so as to conform to the strength requirements of this specification.

7.2 *Curing*—The barrier section shall be subjected to any one of the following methods of curing, or combination thereof. The sections shall be cured for a length of time sufficient to develop the specified concrete compressive strength as determined in accordance with Section 8.

7.2.1 *Accelerated Curing*—The sections may be cured with either low-pressure steam or radiant heat in a moist atmosphere.

7.2.2 *Water Curing*—The sections may be water-cured by covering with water-saturated material or by a system of perforated pipes, mechanical sprinklers, porous hose, or by any other method that will keep the section moist.

7.2.3 *Membrane Curing*—A sealing membrane may be applied at a rate which will restrict the loss of water to not more than  $0.055 \text{ g/cm}^2$  of surface in 72 h. The concrete at the time of application shall be within  $10^\circ\text{F}$  ( $6^\circ\text{C}$ ) of the atmospheric

temperature. All surfaces shall be kept moist prior to the application of the compounds and shall be damp when the compound is applied.

7.2.4 *Curing Options*—Other methods of curing may be used, if approved by the purchaser.

7.3 *Forms*—The forms used in the manufacture of barrier sections shall be sufficiently rigid to maintain production within the permissible tolerances given in Section 9. All casting surfaces shall be of smooth nonporous material.

## 8. Physical Requirements

8.1 *Compression Test Specimens*—The specimens required for the tests shall be furnished by the producer and shall be made at random from different batches. Test specimens shall be identified with barrier sections. Two cylinders will be required for each 25 yd<sup>3</sup> (19 m<sup>3</sup>) with a minimum of 2 cylinders for each day of production. Compression test specimens for satisfying the minimum specified concrete strength requirement shall be made in accordance with Practice C 31 except that curing shall be in accordance with 8.2.

8.2 *Curing Compression Test Specimens*—Test specimens shall be cured in a similar manner to barrier sections if they are steam cured. If barrier sections are cured at normal ambient temperatures, the specimens shall be cured in accordance with Practice C 31.

8.3 *Compression Tests*—Cylinders shall be tested in accordance with Test Method C 39. The average compressive strength of all cylinders tested for each day's production shall be equal to or greater than the specified design strength of the concrete. In no case shall any cylinder tested fall below 80 % of design strength.

8.4 *Core Compression Tests*—If the criteria of 8.3 are not met or as an alternative, the producer or purchaser may agree to use cores taken from the barrier sections in accordance with Test Method C 42. The number of tests required shall be as specified in 8.1. Test results shall conform to 8.3 except that if cores are used the average compressive strength of the test specimens shall be equal to or greater than 3400 psi (23 MPa). No single core shall have a compressive strength less than 3000 psi (21 MPa). If the core tests fail on the daily production run, each barrier section may be individually cored for acceptance.

## 9. Permissible Dimensional Tolerances

9.1 *Cross-Sectional Dimensions*—Cross-sectional dimensions shall not vary from design dimensions by more than ¼ in. (6 mm). The vertical center line shall not be out of plumb by more than ¼ in. (6 mm).

9.2 *Longitudinal Dimensions*—Longitudinal dimensions shall not vary from the design dimensions by more than ¼ in. (6 mm) per 10 ft (3 m) of barrier section and shall not exceed ¾ in. (19 mm) per section.

9.3 *Location of Anchoring Devices*—Location of anchoring holes shall be as specified by the purchaser.

9.4 *Surface Straightness*—When checked with a 10-ft (3-m) straight edge, irregularities measuring more than ¼ in. (6 mm) shall be corrected as the purchaser may order or approve.

9.5 *Position of Reinforcement*—Cover over reinforcement shall be not less than 2 in. (50 mm), except for longitudinal reinforcement at the end face of barrier sections.

## 10. Inspection

10.1 The quality of materials, the process of manufacturing, and the finished median barrier shall be available for inspection by an inspector employed by the purchaser. If the manufacturer is required to obtain the services of an independent testing agency, the costs shall be the purchaser's responsibility.

## 11. Repairs

11.1 Barrier sections may be repaired, if necessary, because of occasional imperfections in manufacture or damage during handling. They shall be acceptable if, in the opinion of the purchaser, the repairs are sound, properly finished, and cured. The repaired sections shall conform to the requirements of this specification. Repairs to correct imperfections in manufacture or damage during handling may be made only after authorization by the purchaser.

## 12. Rejection

12.1 Barrier sections shall be subject to rejection for failure to conform to any of the specification requirements. In addition, individual sections may be rejected due to defects that indicate inadequate proportioning, mixing, or molding.

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