



**The Gambia
Standards Bureau**

Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement¹

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DATE OF PUBLICATION

This Gambian Standard was Gazetted under the authority of the Bureau on 31st July 2017

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For further information on and copies of Gambian Standards, please contact The Gambia Standards Bureau.

TECHNICAL COMMITTEE RESPONSIBLE: BUILDING AND CONSTRUCTION MATERIALS COMMITTEE

The Building and construction materials Committee developed this Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement. The Committee was set up by Bureau in 2016 to work on the development of national standards in the building and civil engineering field.

The BCM consists of representatives from the following Institutions/Organizations:

- Ministry of Transport, Works and Infrastructure
- National Road Authority
- Department of Physical Planning
- Association of Gambian construction Contractors (GACCON)
- University of the Gambia
- Gambia Technical Training Institute
- Insight Training Institute
- GACEM
- Social Security and Housing Finance Cooperation
- GAMWORKS
- Association Real Estates Companies
- Gambia Fire and Rescue Services
- Jah Oil Company
- Salam Cement Company
- Gambia Competition and Consumer Protection Commission
- ABSA Consultancy
- Finish Profiles the Gambia

The Gambia Standards Bureau is the Secretary to the Building and Construction Materials Technical Committee.

FOREWORD

This Gambian Standard was identified and developed by the Building and Construction Materials in response to the clear need at the national level for a detailed and comprehensive Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement I

The standard addresses the following:

- Scope
- References Documents
- Terminology
- Ordinary Information
- Material and Manufacture
- Chemical Composition
- Requirements of Deformation
- Measurement of Deformation
- Tensile Requirements
- Bending Requirement
- Permissible Variation in Weight (Mass)
- Finish
- Number of Test
- Retests
- Test Specimen
- Test Report
- Inspection
- Rejection of Rehearing
- Marking
- Packaging and Package Marking
- Keywords

Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement¹

This standard is issued under the fixed designation A615/A615M; 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 (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope*

- 1.1 This specification covers deformed and plain carbon- steel bars in cut lengths and coils for concrete reinforcement. Steel bars containing alloy additions, such as with the Association for Iron and Steel Technology and the Society of Automotive Engineers series of alloy steels, are permitted if the resulting product meets all the other requirements of this specification. The standard sizes and dimensions of deformed bars and their number designations are given in **Table 1**.
- 1.2 Bars are of five minimum yield strength levels: namely, 40 000 psi [280 MPa], 60 000 psi [420 MPa], 75 000 psi [520MPa], 80 000 psi [550 MPa], and 100 000 psi [690 MPa], designated as Grade 40 [280], Grade 60 [420], Grade 75 [520], Grade 80 [550], and Grade 100 [690], respectively.

NOTE 1—Grade 100 [690] reinforcing bars were introduced in this specification in 2015. In contrast to the lower grades, which have ratios of specified tensile strength to specified yield strength that range from 1.31 to 1.5, Grade 100 [690] reinforcing bars have a ratio of specified tensile strength to specified yield strength of 1.15. Designers should be aware that there will, therefore, be a lower margin of safety and reduced warning of failure following yielding when Grade 100 [690] bars are used in structural members where strength is governed by the tensile strength of the reinforcement, primarily in beams and slabs. If this is of concern, the purchaser has the option of specifying a minimum ratio of tensile strength to actual yield strength. Consensus design codes and specifications such as “Building Code Requirements for Structural Concrete (ACI 318)” may not recognize Grade 100 [690] reinforcing bars: therefore the 125 % of specified yield strength requirements in tension and compression are not applicable. Mechanical and welded splices should meet a minimum specified tensile strength of 115 000 psi [790 MPa].

NOTE 2—Designers need to be aware that design standards do not recognize the use of the No. 20 [64] bar, the largest bar included in this specification. Structural members reinforced with No. 20 [64] bars may require approval of the building official or other appropriate authority and require special detailing to ensure adequate performance at service and factored loads.

- 1.3 Plain bars, in sizes up to and including 2½ in. [63.5 mm] in diameter in coils or cut lengths, when ordered shall be furnished under this specification in Grade 40 [280], Grade 60 [420], Grade 75 [520], Grade 80 [550], and Grade 100 [690]. For ductility properties (elongation and bending), test provisions of the nearest smaller nominal diameter deformed bar size shall apply. Requirements providing for deformations and marking shall not be applicable.

NOTE 3—Welding of the material in this specification should be approached with caution since no specific provisions have been included to enhance its weldability. When this steel is to be welded, a welding procedure suitable for the chemical composition and intended use or service should be used. The use of the latest edition of AWS D1.4/D1.4M is recommended. The AWS D1.4/D1.4M Welding Code describes the proper selection of the filler metals and preheat/interpass temperatures, as well as performance and procedure qualification requirements.

- 1.4 Requirements for alternate bar sizes are presented in **Annex A1**. The requirements in **Annex A1** apply to sizes specified by the purchaser (see **4.2.5**).

- 1.5 The text of this specification references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables) shall not be considered as requirements of the specification.
- 1.6 This specification is applicable for orders in either inch-pound units (as Specification A615) or in SI units (as Specification A615M).
- 1.7 The values stated in either inch-pound units or SI units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the specification.
- 1.8 *This specification does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this specification to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

TABLE 1 Deformed Bar Designation Numbers, Nominal Weights [Masses], Nominal Dimensions, and Deformation Requirements

Bar Designation No.	Nominal Weight, lb/ft [Nominal Mass, kg/m]	Nominal Dimensions ^A			Deformation Requirements, in. [mm]		
		Diameter, in. [mm]	Cross-Sectional Area, in. ² [mm ²]	Perimeter, in. [mm]	Maximum Average Spacing	Minimum Average Height	Maximum Gap (Chord of 12.5 % of Nominal Perimeter)
3 [10]	0.376 [0.560]	0.375 [9.5]	0.11 [71]	1.178 [29.9]	0.262 [6.7]	0.015 [0.38]	0.143 [3.6]
4 [13]	0.668 [0.994]	0.500 [12.7]	0.20 [129]	1.571 [39.9]	0.350 [8.9]	0.020 [0.51]	0.191 [4.9]
5 [16]	1.043 [1.552]	0.625 [15.9]	0.31 [199]	1.963 [49.9]	0.437 [11.1]	0.028 [0.71]	0.239 [6.1]
6 [19]	1.502 [2.235]	0.750 [19.1]	0.44 [284]	2.356 [59.8]	0.525 [13.3]	0.038 [0.97]	0.286 [7.3]
7 [22]	2.044 [3.042]	0.875 [22.2]	0.60 [387]	2.749 [69.8]	0.612 [15.5]	0.044 [1.12]	0.334 [8.5]
8 [25]	2.670 [3.973]	1.000 [25.4]	0.79 [510]	3.142 [79.8]	0.700 [17.8]	0.050 [1.27]	0.383 [9.7]
9 [29]	3.400 [5.060]	1.128 [28.7]	1.00 [645]	3.544 [90.0]	0.790 [20.1]	0.056 [1.42]	0.431 [10.9]
10 [32]	4.303 [6.404]	1.270 [32.3]	1.27 [819]	3.990 [101.3]	0.889 [22.6]	0.064 [1.63]	0.487 [12.4]
11 [36]	5.313 [7.907]	1.410 [35.8]	1.56 [1006]	4.430 [112.5]	0.987 [25.1]	0.071 [1.80]	0.540 [13.7]
14 [43]	7.65 [11.38]	1.693 [43.0]	2.25 [1452]	5.32 [135.1]	1.185 [30.1]	0.085 [2.16]	0.648 [16.5]
18 [57]	13.60 [20.24]	2.257 [57.3]	4.00 [2581]	7.09 [180.1]	1.58 [40.1]	0.102 [2.59]	0.864 [21.9]
20 [64] ^B	16.69 [24.84]	2.500 [63.5]	4.91 [3167]	7.85 [199.5]	1.75 [44.5]	0.113 [2.86]	0.957 [24.3]

^A The nominal dimensions of a deformed bar are equivalent to those of a plain round bar having the same weight [mass] per foot [metre] as the deformed bar.

^B Refer to **Note 2**.

2. Referenced Documents

2.1 *ASTM Standards:*²

- [A6/A6M Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling](#)
- [A370 Test Methods and Definitions for Mechanical Testing of Steel Products](#)
- [A510/A510M Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, and Alloy Steel](#)
- [A700 Guide for Packaging, Marking, and Loading Methods for Steel Products for Shipment](#)
- [A706/A706M Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement](#)
- [A751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products](#)

[E29 Practice for Using Significant Digits in Test Data to](#)

- [Determine Conformance with Specifications](#)
- [E290 Test Methods for Bend Testing of Material for Ductility](#)

2.2 *ACI Standard:*³

- [ACI 318 Building Code Requirements for Structural Concrete](#)

2.3 *AWS Standard:*⁴

- [AWS D1.4/D1.4M Structural Welding Code Reinforcing Steel](#)

2.4 *U.S. Military Standard:*⁵

- [MIL-STD-129 Marking for Shipment and Storage](#)

2.5 *U.S. Federal Standard:*⁵

- [Fed. Std. No. 123 Marking for Shipment \(Civil Agencies\)](#)