# BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY (BUET)

## DEPARTMENT OF CIVIL ENGINEERING

Mobile: 01819557964; PABX: (8802) - 55167100, 55167228-57 Ext. 7226, Info: http://brtc.ce.buet.ac.bd/#/home, Report verification: http://verify.ce.buet.ac.bd

BRTC Bureau of Research, Testing & Consultation

BUETCE 01B 22993

## STRENGTH OF MATERIALS LABORATORY

**TEST OF DEFORMED M.S. BARS [ASTM A 615M-16]**

Sent by: Mirza Md. Iftekhar Ali, Executive Engineer
LGED, Cumilla

Project: Construction of U-Drain Culvert from Dulalpur GC to Dhonnodul R&H Road at Brahmanpara Upazila, Cumilla under GCP-3 Project. (Package No GCP-3/C-W- 196)

**BRTC No.: 1102-77192/CE/22-23; Dt. 29/11/2022**
Ref.: 46.02.1900.000.99.060.22.7038; Dt. 14/11/2022
Date of Test: 30/11/2022
Contractor/supplier: M/S M A Zaher Ltd.

**Samples were received in SEALED condition.**

| Sl. No. | Frog Mark / Identification | Bar Desig./ Nominal dia. | Actual bar dia. | Unit Weight | Average Unit Weight | Yield or Proof Load | Yield or Proof Strength | Average Yield or Proof Strength (YS) | Tensile Load | Tensile Strength | Average Tensile Strength (TS) | TS/YS | Elongation (%) (G. length = 200 mm) | Average Elongation (%) | Bend Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | mm | mm | kg/m | kg/m | kN | MPa | MPa | kN | MPa | MPa | | | | |
| 1 | SAS XBAR B500 DWR | 12 | 12.0 | 0.885 | | 56.2 | 497 | 489 | 72.1 | 640 | 615 | | 16 | | - |
| 2 | SAS XBAR B500 DWR | 12 | 11.8 | 0.862 | 0.868 | 54.8 | 485 | (71000 psi) | 68.6 | 605 | (89500 psi) | 1.26 | 15 | 15 | - |
| 3 | SAS XBAR B500 DWR | 12 | 11.8 | 0.857 | | 54.8 | 485 | | 68.1 | 605 | | | 15 | | - |
| 4 | SAS XBAR B500 DWR | 10 | 9.8 | 0.597 | | 37.2 | 470 | 470 | 48.7 | 615 | 615 | | 16 | | - |
| 5 | SAS XBAR B500 DWR | 10 | 9.8 | 0.597 | 0.597 | 36.7 | 465 | (68000 psi) | 48.2 | 610 | (89500 psi) | 1.31 | 16 | 16 | - |
| 6 | SAS XBAR B500 DWR | 10 | 9.8 | 0.597 | | 37.6 | 476 | | 49.1 | 620 | | | 15 | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |

**ASTM A615M-16 Weight Requirements and Nominal Area of bars (Table A1.1)**

| Bar desig./Nominal dia., mm | 8 | 10 | 12 | 16 | 20 | 22 | 25 | 28 | 32 | 36 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal area, sq.mm | 50.3 | 79 | 113 | 201 | 314 | 380 | 491 | 616 | 804 | 1018 | 1257 | 1963 | 2827 |
| Nominal weight, kg/m | 0.395 | 0.617 | 0.888 | 1.578 | 2.466 | 2.98 | 3.853 | 4.834 | 6.313 | 7.99 | 9.865 | 15.41 | 22.2 |

Conversion factor: 1.0 MPa = 1.0 N/mm$^2$ = 145 psi. Strengths are based on nominal area.

**Measured unit weight shall not be less than 94% of the nominal weight. 8mm bar size is not covered in ASTM A615M-16.**
**Area and weight of 8mm and 22m dia. bars are derived based on principle follwed for other sizes in Table A1.1**
**Actual dia. and TS/YS ratio are provided for informative purpose only. These are not requirements of ASTM A615M-16.**
**Actual diameter is the diameter of a perfectly round plain bar having same mass per unit length.**

**ASTM A615M-16 Tensile Requirements for Common Steel Grades**

| | Grade 60 [420] | Grade 75 [520] | Grade 80 [550] |
|---|---|---|---|
| Tensile strength, min. psi [MPa] | 90 000 [620] | 100 000 [690] | 105 000 [725] |
| Yield strength, min, psi [MPa] | 60 000 [420] | 75 000 [520] | 80 000 [550] |
| Elongation in 8 in. [200 mm], min, % | | | |
| Bar Designation No. | | | |
| 10, 12, 16, 20 | 9 | 7 | 7 |
| 25, 22 | 8 | 7 | 7 |
| 28, 32, 36, 40, 50, 60 | 7 | 6 | 6 |

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Department of Civil Engineering, BUET, Dhaka-1000, Bangladesh

03 December 2022

Counter-signed by:
Prof. Dr. A. B. M. Badruzzaman, Test-in-Charge
Dept. of Civil Engg., BUET

Test performed by:
Dr. Md. Zakaria Ahmed
Professor, Dept. of Civil Engg.

***Important Note:*** *Samples as supplied to us have been tested. BRTC does not have any responsibility as to the representative character of the samples required to be tested. It is recommended that the samples are sent in a secure and sealed cover/packet/container under the signature of a competent authority. In order to avoid fradulent fabrication of test results, this report has been printed on a security paper. It is also recommended that the test results be collected by a duly authorized person.*

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## DEPARTMENT OF CIVIL ENGINEERING

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BRTC Bureau of Research, Testing & Consultation

## STRENGTH OF MATERIALS LABORATORY

BUETCE 038 2552

**TEST OF DEFORMED M.S. BARS [ASTM A 615M-16]**

Sent by: Mirza Md. Iftekhar Ali, Executive Engineer
LGED, Cumilla

Project: Construction of Protective Wall at Darbeshpara Bazar - Goiyarvanga - Palpara - Parti Bazar Road at Lalmai Upazila, Cumilla under CAFDRIRP Project. (Package No: CAFDRIRP/CUM/VR/W- 19)

**BRTC No.: 1102-77192/CE/22-23; Dt. 29/11/2022**
Ref.: 46.02.1900.000.99..060.22.7039; Dt. 14/11/2022
Date of Test: 30/11/2022
Contractor/supplier: M/S Noor Enterprise & M/S Landmark Builders

**Samples were received in SEALED condition.**

| Sl. No. | Frog Mark / Identification | Bar Desig./ Nominal dia. | Actual bar dia. | Unit Weight | Average Unit Weight | Yield or Proof Load | Yield or Proof Strength | Average Yield or Proof Strength (YS) | Tensile Load | Tensile Strength | Average Tensile Strength (TS) | TS/YS | Elongation (%) (G. length = 200 mm) | Average Elongation (%) | Bend Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | mm | mm | kg/m | kg/m | kN | MPa | MPa | kN | MPa | MPa | | | | |
| 1 | SAS XBAR 400+ | 25 | 25.1 | 3.898 | | 221 | 451 | 458 | 320 | 655 | 665 | | 18 | | - |
| 2 | SAS XBAR 400+ | 25 | 25.5 | 4.000 | 3.925 | 229 | 467 | (66500 psi) | 333 | 680 | (96000 psi) | 1.45 | 20 | 19 | - |
| 3 | SAS XBAR 400+ | 25 | 25.1 | 3.877 | | 224 | 457 | | 322 | 655 | | | 18 | | - |
| 4 | SAS XBAR B420 DWR | 12 | 12.1 | 0.900 | | 50 | 442 | 441 | 70.3 | 620 | 630 | | 19 | | - |
| 5 | SAS XBAR B420 DWR | 12 | 12.1 | 0.910 | 0.904 | 50.4 | 446 | (64000 psi) | 72.1 | 640 | (91000 psi) | 1.43 | 18 | 18 | - |
| 6 | SAS XBAR B420 DWR | 12 | 12.1 | 0.903 | | 49.1 | 434 | | 70.3 | 620 | | | 18 | | - |
| 7 | SAS XBAR B400 CWR | 10 | 10.2 | 0.636 | | 34.9 | 442 | 448 | 49.1 | 620 | 625 | | 18 | | - |
| 8 | SAS XBAR B400 CWR | 10 | 10.3 | 0.652 | 0.641 | 36.7 | 465 | (65000 psi) | 50 | 635 | (90500 psi) | 1.40 | 17 | 18 | - |
| 9 | SAS XBAR B400 CWR | 10 | 10.2 | 0.636 | | 34.5 | 437 | | 49.1 | 620 | | | 18 | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |

Conversion factor: 1.0 MPa = 1.0 N/mm$^2$ = 145 psi. Strengths are based on nominal area.

**ASTM A615M-16 Weight Requirements and Nominal Area of bars (Table A1.1)**

| Bar desig./Nominal dia., mm | 8 | 10 | 12 | 16 | 20 | 22 | 25 | 28 | 32 | 36 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal area, sq.mm | 50.3 | 79 | 113 | 201 | 314 | 380 | 491 | 616 | 804 | 1018 | 1257 | 1963 | 2827 |
| Nominal weight, kg/m | 0.395 | 0.617 | 0.888 | 1.578 | 2.466 | 2.98 | 3.853 | 4.834 | 6.313 | 7.99 | 9.865 | 15.41 | 22.2 |

Measured unit weight shall not be less than 94% of the nominal weight. 8mm bar size is not covered in ASTM A615M-16.
Area and weight of 8mm and 22m dia. bars are derived based on principle follwed for other sizes in Table A1.1
Actual dia. and TS/YS ratio are provided for informative purpose only. These are not requirements of ASTM A615M-16.
Actual diameter is the diameter of a perfectly round plain bar having same mass per unit length.

**ASTM A615M-16 Tensile Requirements for Common Steel Grades**

| | Grade 60 [420] | Grade 75 [520] | Grade 80 [550] |
|---|---|---|---|
| Tensile strength, min. psi [MPa] | 90 000 [620] | 100 000 [690] | 105 000 [725] |
| Yield strength, min, psi [MPa] | 60 000 [420] | 75 000 [520] | 80 000 [550] |
| Elongation in 8 in. [200 mm], min, % | | | |
| Bar Designation No. | | | |
| 10, 12, 16, 20 | 9 | 7 | 7 |
| 25, 22 | 8 | 7 | 7 |
| 28, 32, 36, 40, 50, 60 | 7 | 6 | 6 |

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Department of Civil Engineering, BUET, Dhaka-1000, Bangladesh

01 December 2022

**Countersigned by:**
Prof. Dr. A. B. M. Badruzzaman, Test-in-Charge
Dept. of Civil Engg., BUET

**Test performed by:**
Dr. Md. Zakaria Ahmed
Professor, Dept. of Civil Engg.

***Important Note:*** *Samples as supplied to us have been tested. BRTC does not have any responsibility as to the representative character of the samples required to be tested. It is recommended that the samples are sent in a secure and sealed cover/packet/container under the signature of a competent authority. In order to avoid fradulent fabrication of test results, this report has been printed on a security paper. It is also recommended that the test results be collected by a duly authorized person.*

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BRTC Bureau of Research, Testing & Consultation

BUETCE 0388470

## STRENGTH OF MATERIALS LABORATORY

**TEST OF DEFORMED M.S. BARS [ASTM A 615M-16]**

Sent by: জনাব মীর্জা মোঃ ইফতেখার আলী, নির্বাহী প্রকৌশলী
এলজিইডি, কুমিল্লা

Project: "প্রোগ্রাম ফর সাপোর্টিং রুরাল ব্রীজেস (SupRB) প্রকল্প" এর আওতায় কুমিল্লা জেলার মেঘনা উপজেলাধীন হোমনা - গৌরিপুর আরএন্ডএইচ সড়কে ৯৮০.০মি. চেইনেজে, ৩০৪.০মি. আরসিসি গার্ডার ব্রীজ মেরামত।
(Package No: SupRB/Cum/Maint/21-22/W-226)

**BRTC No.: 1102-75725/CE/22-23; Dt. 13/11/2022**
Ref.: 46.02.1900.000.99..060.22.6757; Dt. 3/11/2022
Date of Test: 14/11/2022
Contractor/supplier: মেসার্স নিয়াজ ট্রেডার্স

**Samples were received in SEALED condition.**

| Sl. No. | Frog Mark / Identification | Bar Desig./ Nominal dia. | Actual bar dia. | Unit Weight | Average Unit Weight | Yield or Proof Load | Yield or Proof Strength | Average Yield or Proof Strength (YS) | Tensile Load | Tensile Strength | Average Tensile Strength (TS) | TS/YS | Elongation (%) (G. length = 200 mm) | Average Elongation (%) | Bend Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | mm | mm | kg/m | kg/m | kN | MPa | MPa | kN | MPa | MPa | | | | |
| 1 | SAS XBAR B500 CWR | 10 | 10.1 | 0.629 | | 43.2 | 545 | 545 | 50.3 | 635 | 635 | | 17 | | - |
| 2 | SAS XBAR B500 CWR | 10 | 10.1 | 0.634 | 0.626 | 43.2 | 545 | (78500 psi) | 50.3 | 635 | (92500 psi) | 1.17 | 17 | 17 | - |
| 3 | SAS XBAR B500 CWR | 10 | 10.0 | 0.614 | | 42.2 | 535 | | 50.3 | 635 | | | 17 | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |

Conversion factor: 1.0 MPa = 1.0 N/mm² = 145 psi. Strengths are based on nominal area.

**ASTM A615M-16 Weight Requirements and Nominal Area of bars (Table A1.1)**

| Bar desig./Nominal dia., mm | 8 | 10 | 12 | 16 | 20 | 22 | 25 | 28 | 32 | 36 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal area, sq.mm | 50.3 | 79 | 113 | 201 | 314 | 380 | 491 | 616 | 804 | 1018 | 1257 | 1963 | 2827 |
| Nominal weight, kg/m | 0.395 | 0.617 | 0.888 | 1.578 | 2.466 | 2.98 | 3.853 | 4.834 | 6.313 | 7.99 | 9.865 | 15.41 | 22.2 |

Measured unit weight shall not be less than 94% of the nominal weight. 8mm bar size is not covered in ASTM A615M-16.
Area and weight of 8mm and 22m dia. bars are derived based on principle follwed for other sizes in Table A1.1
Actual dia. and TS/YS ratio are provided for informative purpose only. These are not requirements of ASTM A615M-16.
Actual diameter is the diameter of a perfectly round plain bar having same mass per unit length.

**ASTM A615M-16 Tensile Requirements for Common Steel Grades**

| | Grade 60 [420] | Grade 75 [520] | Grade 80 [550] |
|---|---|---|---|
| Tensile strength, min. psi [MPa] | 90 000 [620] | 100 000 [690] | 105 000 [725] |
| Yield strength, min, psi [MPa] | 60 000 [420] | 75 000 [520] | 80 000 [550] |
| Elongation in 8 in. [200 mm], min, % | | | |
| Bar Designation No. | | | |
| 10, 12, 16, 20 | 9 | 7 | 7 |
| 25, 22 | 8 | 7 | 7 |
| 28, 32, 36, 40, 50, 60 | 7 | 6 | 6 |

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Department of Civil Engineering, BUET, Dhaka-1000, Bangladesh

17 November 2022

Counter signed by:
Prof. Dr. A. B. M. Badruzzaman, Test-in-Charge
Dept. of Civil Engg., BUET

Test performed by:
Dr. Abu Siddique
Professor, Dept. of Civil Engg.

***Important Note:*** *Samples as supplied to us have been tested. BRTC does not have any responsibility as to the representative character of the samples required to be tested. It is recommended that the samples are sent in a secure and sealed cover/packet/container under the signature of a competent authority. In order to avoid fradulent fabrication of test results, this report has been printed on a security paper. It is also recommended that the test results be collected by a duly authorized person.*

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BRTC Bureau of Research, Testing & Consultation

## STRENGTH OF MATERIALS LABORATORY

BUETCE 0388401

**TEST OF DEFORMED M.S. BARS [ASTM A 615M-16]**

Sent by: জনাব মীর্জা মোঃ ইফতেখার আলী, নির্বাহী প্রকৌশলী
এলজিইডি, কুমিল্লা

Project: "কুমিল্লা, ব্রাহ্মণবাড়ীয়া ও চাঁদপুর জেলার গুরুত্বপূর্ণ গ্রামীণ অবকাঠামো উন্নয়ন প্রকল্প" এর আওতায় কুমিল্লা জেলার চৌদ্দগ্রাম উপজেলাধীন বসন্তপুর (মনবাড়ী) বিষবাগ - কনকপুর সড়কে প্রটেক্টিভ ওয়াল নির্মাণ ( Package No:CCB/C/VR/W-76)

**BRTC No.: 1102-75725/CE/22-23; Dt. 13/11/2022**
Ref.: 46.02.1900.000.99..060.22.6756; Dt. 3/11/2022
Date of Test: 14/11/2022
Contractor/supplier: মেসার্স মাইমুনা এন্টারপ্রাইজ
**Samples were received in SEALED condition.**

| Sl. No. | Frog Mark / Identification | Bar Desig./ Nominal dia. | Actual bar dia. | Unit Weight | Average Unit Weight | Yield or Proof Load | Yield or Proof Strength | Average Yield or Proof Strength (YS) | Tensile Load | Tensile Strength | Average Tensile Strength (TS) | TS/YS | Elongation (%) (G. length = 200 mm) | Average Elongation (%) | Bend Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | mm | mm | kg/m | kg/m | kN | MPa | MPa | kN | MPa | MPa | | | | |
| 1 | SAS XBAR B420 DWR | 12 | 12.2 | 0.916 | | 50 | 442 | 446 | 71.2 | 630 | 630 | | 18 | | - |
| 2 | SAS XBAR B420 DWR | 12 | 12.1 | 0.896 | 0.904 | 50.9 | 450 | (64500 psi) | 71.6 | 635 | (91500 psi) | 1.41 | 18 | 18 | - |
| 3 | SAS XBAR B420 DWR | 12 | 12.1 | 0.900 | | 50.4 | 446 | | 71.2 | 630 | | | 17 | | - |
| 4 | SAS XBAR B400 CWR | 10 | 10.3 | 0.654 | | 36.3 | 459 | 446 | 50.4 | 640 | 625 | | 17 | | - |
| 5 | SAS XBAR B400 CWR | 10 | 10.2 | 0.636 | 0.645 | 34.5 | 437 | (64500 psi) | 48.7 | 615 | (91000 psi) | 1.40 | 18 | 17 | - |
| 6 | SAS XBAR B400 CWR | 10 | 10.2 | 0.644 | | 34.9 | 442 | | 49.5 | 625 | | | 17 | | - |
| 7 | SAS XBAR 400+ | 8 | 8.5 | 0.440 | | 23.4 | 466 | 457 | 31 | 615 | 605 | | 17 | | - |
| 8 | SAS XBAR 400+ | 8 | 8.4 | 0.435 | 0.437 | 23.4 | 466 | (66500 psi) | 30.5 | 605 | (87500 psi) | 1.32 | 16 | 17 | - |
| 9 | SAS XBAR 400+ | 8 | 8.4 | 0.437 | | 22.1 | 440 | | 29.6 | 590 | | | 17 | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |

Conversion factor: 1.0 MPa = 1.0 N/mm$^2$ = 145 psi. Strengths are based on nominal area.

**ASTM A615M-16 Weight Requirements and Nominal Area of bars (Table A1.1)**

| Bar desig./Nominal dia., mm | 8 | 10 | 12 | 16 | 20 | 22 | 25 | 28 | 32 | 36 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal area, sq.mm | 50.3 | 79 | 113 | 201 | 314 | 380 | 491 | 616 | 804 | 1018 | 1257 | 1963 | 2827 |
| Nominal weight, kg/m | 0.395 | 0.617 | 0.888 | 1.578 | 2.466 | 2.98 | 3.853 | 4.834 | 6.313 | 7.99 | 9.865 | 15.41 | 22.2 |

Measured unit weight shall not be less than 94% of the nominal weight. 8mm bar size is not covered in ASTM A615M-16.
Area and weight of 8mm and 22m dia. bars are derived based on principle follwed for other sizes in Table A1.1
Actual dia. and TS/YS ratio are provided for informative purpose only. These are not requirements of ASTM A615M-16.
Actual diameter is the diameter of a perfectly round plain bar having same mass per unit length.

**ASTM A615M-16 Tensile Requirements for Common Steel Grades**

| | Grade 60 [420] | Grade 75 [520] | Grade 80 [550] |
|---|---|---|---|
| Tensile strength, min. psi [MPa] | 90 000 [620] | 100 000 [690] | 105 000 [725] |
| Yield strength, min, psi [MPa] | 60 000 [420] | 75 000 [520] | 80 000 [550] |
| Elongation in 8 in. [200 mm], min, % | | | |
| Bar Designation No. | | | |
| 10, 12, 16, 20 | 9 | 7 | 7 |
| 25, 22 | 8 | 7 | 7 |
| 28, 32, 36, 40, 50, 60 | 7 | 6 | 6 |

94
BH9mjKeGt

Department of Civil Engineering, BUET, Dhaka-1000, Bangladesh

15 November 2022

Countersigned by:
Prof. Dr. A. B. M. Badruzzaman, Test-in-Charge
Dept. of Civil Engg., BUET

Test performed by:
Dr. Abu Siddique
Professor, Dept. of Civil Engg.

***Important Note:*** *Samples as supplied to us have been tested. BRTC does not have any responsibility as to the representative character of the samples required to be tested. It is recommended that the samples are sent in a secure and sealed cover/packet/container under the signature of a competent authority. In order to avoid fradulent fabrication of test results, this report has been printed on a security paper. It is also recommended that the test results be collected by a duly authorized person.*

# BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY (BUET)

## DEPARTMENT OF CIVIL ENGINEERING

Mobile: 01819557964; PABX: (8802) - 55167100, 55167228-57 Ext. 7226, Info: http://brtc.ce.buet.ac.bd/#/home, Report verification: http://verify.ce.buet.ac.bd

BRTC Bureau of Research, Testing & Consultation

BUETCE 038847

## STRENGTH OF MATERIALS LABORATORY

**TEST OF DEFORMED M.S. BARS [ASTM A 615M-16]**

Sent by: জনাব মীর্জা মোঃ ইফতেখার আলী, নির্বাহী প্রকৌশলী
এলজিইডি, কুমিল্লা

Project: "কুমিল্লা ব্রাহ্মণবাড়ীয়া ও চাঁদপুর জেলার গুরুত্বপূর্ণ গ্রামীণ অবকাঠামো উন্নয়ন প্রকল্প"এর আওতায় কুমিল্লা জেলার মনোহরগঞ্জ উপজেলাধীন নাখেরপেটুয়া ষ্টেশান বাজার আটিয়া বাজার সড়ক ভাষা আলোকদিয়া মনোহরগঞ্জ অংশ সড়ক উন্নয়ন এবং ঠেঙ্গারবাম উত্তরপাড়া -ঠেঙ্গারবাম দক্ষিণ পাড়া সড়কে ইউভেন কালভার্ট ও প্রটেক্টিভ ওয়াল নির্মাণ (Package No:CCB/C/VR/W-24)

**BRTC No.: 1102-75725/CE/22-23; Dt. 13/11/2022**
Ref.: 46.02.1900.000.99..060.22.6521; Dt. 27/10/2022
Date of Test: 14/11/2022
Contractor/supplier: মেসার্স হাই এন্ড কোং

**Samples were received in SEALED condition.**

| Sl. No. | Frog Mark / Identification | Bar Desig./ Nominal dia. | Actual bar dia. | Unit Weight | Average Unit Weight | Yield or Proof Load | Yield or Proof Strength | Average Yield or Proof Strength (YS) | Tensile Load | Tensile Strength | Average Tensile Strength (TS) | TS/YS | Elongation (%) (G. length = 200 mm) | Average Elongation (%) | Bend Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | mm | mm | kg/m | kg/m | kN | MPa | MPa | kN | MPa | MPa | | | | |
| 1 | SAS XBAR B420 DWR | 16 | 16.1 | 1.605 | | 89.9 | 447 | 444 | 137 | 680 | 675 | | 18 | | - |
| 2 | SAS XBAR B420 DWR | 16 | 16.2 | 1.620 | 1.615 | 86.9 | 432 | (64500 psi) | 134 | 665 | (98000 psi) | 1.52 | 18 | 18 | - |
| 3 | SAS XBAR B420 DWR | 16 | 16.2 | 1.621 | | 90.9 | 452 | | 137 | 680 | | | 17 | | - |
| 4 | SAS XBAR B420 DWR | 12 | 12.4 | 0.942 | | 52.6 | 466 | 467 | 73.4 | 650 | 635 | | 18 | | - |
| 5 | SAS XBAR B420 DWR | 12 | 12.4 | 0.949 | 0.931 | 52.6 | 466 | (67500 psi) | 73.4 | 650 | (92000 psi) | 1.36 | 18 | 18 | - |
| 6 | SAS XBAR B420 DWR | 12 | 12.1 | 0.903 | | 53.1 | 470 | | 67.7 | 600 | | | 17 | | - |
| 7 | SAS XBAR B500 DWR | 10 | 10.1 | 0.629 | | 41.6 | 525 | - | 50.4 | 640 | 620 | | 14 | | - |
| 8 | SAS XBAR B500 DWR | 10 | 10.3 | 0.649 | 0.623 | 42 | 530 | - | 50.4 | 640 | (89500 psi) | - | 14 | 14 | - |
| 9 | SAS XBAR B500 DWR | 10 | 9.8 | 0.591 | | 33.2 | 420 | | 45.6 | 575 | | | 15 | | - |
| 10 | SAS XBAR ------- | 8 | 8.6 | 0.453 | | 24.8 | 492 | 469 | 31.8 | 635 | 615 | | 17 | | - |
| 11 | SAS XBAR ------- | 8 | 8.5 | 0.442 | 0.446 | 23.9 | 475 | (68000 psi) | 31 | 615 | (89000 psi) | 1.31 | 16 | 17 | - |
| 12 | SAS XBAR ------- | 8 | 8.5 | 0.444 | | 22.1 | 440 | | 30.1 | 600 | | | 17 | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |

Conversion factor: 1.0 MPa = 1.0 N/mm$^2$ = 145 psi. Strengths are based on nominal area.

**ASTM A615M-16 Weight Requirements and Nominal Area of bars (Table A1.1)**

| Bar desig./Nominal dia., mm | 8 | 10 | 12 | 16 | 20 | 22 | 25 | 28 | 32 | 36 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal area, sq.mm | 50.3 | 79 | 113 | 201 | 314 | 380 | 491 | 616 | 804 | 1018 | 1257 | 1963 | 2827 |
| Nominal weight, kg/m | 0.395 | 0.617 | 0.888 | 1.578 | 2.466 | 2.98 | 3.853 | 4.834 | 6.313 | 7.99 | 9.865 | 15.41 | 22.2 |

Measured unit weight shall not be less than 94% of the nominal weight. 8mm bar size is not covered in ASTM A615M-16.
Area and weight of 8mm and 22m dia. bars are derived based on principle follwed for other sizes in Table A1.1
Actual dia. and TS/YS ratio are provided for informative purpose only. These are not requirements of ASTM A615M-16.
Actual diameter is the diameter of a perfectly round plain bar having same mass per unit length.

**ASTM A615M-16 Tensile Requirements for Common Steel Grades**

| | Grade 60 [420] | Grade 75 [520] | Grade 80 [550] |
|---|---|---|---|
| Tensile strength, min. psi [MPa] | 90 000 [620] | 100 000 [690] | 105 000 [725] |
| Yield strength, min, psi [MPa] | 60 000 [420] | 75 000 [520] | 80 000 [550] |
| Elongation in 8 in. [200 mm], min, % | | | |
| Bar Designation No. | | | |
| 10, 12, 16, 20 | 9 | 7 | 7 |
| 25, 22 | 8 | 7 | 7 |
| 28, 32, 36, 40, 50, 60 | 7 | 6 | 6 |

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Department of Civil Engineering, BUET, Dhaka-1000, Bangladesh

17 November 2022

Countersigned by:
Prof. Dr. A. B. M. Badruzzaman, Test-in-Charge
Dept. of Civil Engg., BUET

Test performed by:
Dr. Abu Siddique
Professor, Dept. of Civil Engg.

***Important Note:*** *Samples as supplied to us have been tested. BRTC does not have any responsibility as to the representative character of the samples required to be tested. It is recommended that the samples are sent in a secure and sealed cover/packet/container under the signature of a competent authority. In order to avoid fradulent fabrication of test results, this report has been printed on a security paper. It is also recommended that the test results be collected by a duly authorized person.*

# BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY (BUET)

## DEPARTMENT OF CIVIL ENGINEERING

Mobile: 01819557964; PABX: (8802) - 55167100, 55167228-57 Ext. 7226, Info: http://brtc.ce.buet.ac.bd/#/home, Report verification: http://verify.ce.buet.ac.bd

## STRENGTH OF MATERIALS LABORATORY

BRTC Bureau of Research, Testing & Consultation

BUETCE 0388466

**TEST OF DEFORMED M.S. BARS [ASTM A 615M-16]**

Sent by: জনাব মীর্জা মোঃ ইফতেখার আলী, নির্বাহী প্রকৌশলী
এলজিইডি, কুমিল্লা

Project: "গ্রামীণ সড়ক মেরামত/সংরক্ষণ কর্মসূচী" এর আওতায় কুমিল্লা জেলার আদর্শ সদর উপজেলাধীন কালকেরপাড় আরএইডি বিবির বাজার সড়কে প্রটেক্টিভ ওয়াল নির্মাণ (Package No- LGED/Cum/GOB/20-21/W-100)

**BRTC No.: 1102-75731/CE/22-23; Dt. 13/11/2022**
Ref.: 46.02.1900.000.99..060.22.6921; Dt. 9/11/2022
Date of Test: 14/11/2022
Contractor/supplier: মেসার্স মোস্তফা জামাল ট্রেডার্স (প্রাঃ) লিঃ
**Samples were received in SEALED condition.**

| Sl. No. | Frog Mark / Identification | Bar Desig./ Nominal dia. | Actual bar dia. | Unit Weight | Average Unit Weight | Yield or Proof Load | Yield or Proof Strength | Average Yield or Proof Strength (YS) | Tensile Load | Tensile Strength | Average Tensile Strength (TS) | TS/YS | Elongation (%) (G. length = 200 mm) | Average Elongation (%) | Bend Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | mm | mm | kg/m | kg/m | kN | MPa | MPa | kN | MPa | MPa | | | | |
| 1 | SAS XBAR B420 DWR | 12 | 12.0 | 0.895 | | 48.2 | 427 | 434 | 69.4 | 615 | 620 | | 19 | | - |
| 2 | SAS XBAR B420 DWR | 12 | 12.2 | 0.912 | 0.903 | 50 | 442 | (63000 psi) | 71.2 | 630 | (90000 psi) | 1.43 | 18 | 18 | - |
| 3 | SAS XBAR B420 DWR | 12 | 12.1 | 0.901 | | 49.1 | 434 | | 69.9 | 620 | | | 18 | | - |
| 4 | SAS XBAR 400+ | 8 | 8.5 | 0.450 | | 25.2 | 500 | 484 | 32.3 | 640 | 615 | | 18 | | - |
| 5 | SAS XBAR 400+ | 8 | 8.3 | 0.428 | 0.437 | 23.4 | 466 | (70000 psi) | 30.1 | 600 | (89000 psi) | 1.27 | 18 | 18 | - |
| 6 | SAS XBAR 400+ | 8 | 8.4 | 0.433 | | 24.3 | 484 | | 30.5 | 605 | | | 17 | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |

Conversion factor: 1.0 MPa = 1.0 N/mm$^2$ = 145 psi. Strengths are based on nominal area.

**ASTM A615M-16 Weight Requirements and Nominal Area of bars (Table A1.1)**

| Bar desig./Nominal dia., mm | *8* | 10 | 12 | 16 | 20 | *22* | 25 | 28 | 32 | 36 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal area, sq.mm | *50.3* | 79 | 113 | 201 | 314 | *380* | 491 | 616 | 804 | 1018 | 1257 | 1963 | 2827 |
| Nominal weight, kg/m | *0.395* | 0.617 | 0.886 | 1.578 | 2.466 | *2.98* | 3.853 | 4.834 | 6.313 | 7.99 | 9.865 | 15.41 | 22.2 |

Measured unit weight shall not be less than 94% of the nominal weight. 8mm bar size is not covered in ASTM A615M-16.
Area and weight of 8mm and 22m dia. bars are derived based on principle follwed for other sizes in Table A1.1
Actual dia. and TS/YS ratio are provided for informative purpose only. These are not requirements of ASTM A615M-16.
Actual diameter is the diameter of a perfectly round plain bar having same mass per unit length.

**ASTM A615M-16 Tensile Requirements for Common Steel Grades**

| | Grade 60 [420] | Grade 75 [520] | Grade 80 [550] |
|---|---|---|---|
| Tensile strength, min. psi [MPa] | 90 000 [620] | 100 000 [690] | 105 000 [725] |
| Yield strength, min, psi [MPa] | 60 000 [420] | 75 000 [520] | 80 000 [550] |
| Elongation in 8 in. [200 mm], min, % | | | |
| Bar Designation No. | | | |
| 10, 12, 16, 20 | 9 | 7 | 7 |
| 25, 22 | 8 | 7 | 7 |
| 28, 32, 36, 40, 50, 60 | 7 | 6 | 6 |

106
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Department of Civil Engineering, BUET, Dhaka-1000, Bangladesh

17 November 2022

**Counter-signed by:**
Prof. Dr. A. B. M. Badruzzaman, Test-in-Charge
Dept. of Civil Engg., BUET

**Test performed by:**
Dr. Abu Siddique
Professor, Dept. of Civil Engg.

***Important Note:*** *Samples as supplied to us have been tested. BRTC does not have any responsibility as to the representative character of the samples required to be tested. It is recommended that the samples are sent in a secure and sealed cover/packet/container under the signature of a competent authority. In order to avoid fradulent fabrication of test results, this report has been printed on a security paper. It is also recommended that the test results be collected by a duly authorized person.*

# BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY (BUET)

## DEPARTMENT OF CIVIL ENGINEERING

Mobile: 01819557964; PABX: (8802) - 55167100, 55167228-57 Ext. 7226, Info: http://brtc.ce.buet.ac.bd/#/home, Report verification: http://verify.ce.buet.ac.bd

BRTC Bureau of Research, Testing & Consultation

## STRENGTH OF MATERIALS LABORATORY

BUETCE 038467

**TEST OF DEFORMED M.S. BARS [ASTM A 615M-16]**

Sent by: জনাব মীর্জা মোঃ ইফতেখার আলী, নির্বাহী প্রকৌশলী
এলজিইডি, কুমিল্লা

Project: "গ্রাম সড়ক পুনর্বাসন প্রকল্প" এর আওতায় কুমিল্লা জেলার চৌদ্দগ্রাম উপজেলাধীন মাশকরা গ্রাম্য পূর্ণবাসন সড়কে ইউড্রেন কালভার্ট নির্মাণ (Package No: VRRP/Re-hab/2021-2022/W-1947)

**BRTC No.: 1102-75731/CE/22-23; Dt. 13/11/2022**
Ref.: 46.02.1900.000.99..060.22.6918; Dt. 9/11/2022
Date of Test: 14/11/2022
Contractor/supplier: মেসার্স পলি এন্টারপ্রাইজ
**Samples were received in SEALED condition.**

| Sl. No. | Frog Mark / Identification | Bar Desig./ Nominal dia. | Actual bar dia. | Unit Weight | Average Unit Weight | Yield or Proof Load | Yield or Proof Strength | Average Yield or Proof Strength (YS) | Tensile Load | Tensile Strength | Average Tensile Strength (TS) | TS/YS | Elongation (%) | Average Elongation (%) | Bend Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | mm | mm | kg/m | kg/m | kN | MPa | MPa | kN | MPa | MPa | | (G. length = 200 mm) | | |
| 1 | SAS XBAR B420 DWR | 12 | 12.1 | 0.906 | | 49.3 | 437 | 437 | 69.6 | 615 | 620 | | 17 | | - |
| 2 | SAS XBAR B420 DWR | 12 | 12.1 | 0.908 | 0.905 | 50.3 | 445 | (63500 psi) | 70.7 | 625 | (90000 psi) | 1.42 | 18 | 18 | - |
| 3 | SAS XBAR B420 DWR | 12 | 12.1 | 0.902 | | 48.3 | 428 | | 70.7 | 625 | | | 18 | | - |
| 4 | SAS XBAR B400 CWR | 10 | 10.2 | 0.637 | | 35.1 | 444 | 431 | 49.3 | 625 | 610 | | 18 | | - |
| 5 | SAS XBAR B400 CWR | 10 | 9.7 | 0.585 | 0.620 | 35.1 | 444 | (62500 psi) | 49.3 | 625 | (88500 psi) | 1.42 | 18 | 18 | - |
| 6 | SAS XBAR B400 CWR | 10 | 10.2 | 0.639 | | 32.1 | 406 | | 46.3 | 585 | | | 18 | | - |
| 7 | SAS XBAR 400+ | 8 | 8.4 | 0.437 | | 23.4 | 466 | 475 | 30.5 | 605 | 615 | | 17 | | - |
| 8 | SAS XBAR 400+ | 8 | 8.5 | 0.445 | 0.439 | 25.2 | 500 | (69000 psi) | 31.8 | 635 | (89000 psi) | 1.29 | 18 | 17 | - |
| 9 | SAS XBAR 400+ | 8 | 8.4 | 0.434 | | 23 | 457 | | 30.1 | 600 | | | 17 | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |

**ASTM A615M-16 Weight Requirements and Nominal Area of bars (Table A1.1)**

| Bar desig./Nominal dia., mm | 8 | 10 | 12 | 16 | 20 | 22 | 25 | 28 | 32 | 36 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal area, sq.mm | 50.3 | 79 | 113 | 201 | 314 | 380 | 491 | 616 | 804 | 1018 | 1257 | 1963 | 2827 |
| Nominal weight, kg/m | 0.395 | 0.617 | 0.888 | 1.578 | 2.466 | 2.98 | 3.853 | 4.834 | 6.313 | 7.99 | 9.865 | 15.41 | 22.2 |

Measured unit weight shall not be less than 94% of the nominal weight. 8mm bar size is not covered in ASTM A615M-16.
Area and weight of 8mm and 22m dia. bars are derived based on principle follwed for other sizes in Table A1.1
Actual dia. and TS/YS ratio are provided for informative purpose only. These are not requirements of ASTM A615M-16.
Actual diameter is the diameter of a perfectly round plain bar having same mass per unit length.

Conversion factor: 1.0 MPa = 1.0 N/mm$^2$ = 145 psi. Strengths are based on nominal area.

**ASTM A615M-16 Tensile Requirements for Common Steel Grades**

| | Grade 60 [420] | Grade 75 [520] | Grade 80 [550] |
|---|---|---|---|
| Tensile strength, min. psi [MPa] | 90 000 [620] | 100 000 [690] | 105 000 [725] |
| Yield strength, min, psi [MPa] | 60 000 [420] | 75 000 [520] | 80 000 [550] |
| Elongation in 8 in. [200 mm], min, % | | | |
| Bar Designation No. | | | |
| 10, 12, 16, 20 | 9 | 7 | 7 |
| 25, 22 | 8 | 7 | 7 |
| 28, 32, 36, 40, 50, 60 | 7 | 6 | 6 |

109
SNJMBS3ZK

Department of Civil Engineering, BUET, Dhaka-1000, Bangladesh

17 November 2022

Counter signed by:
Prof. Dr. A. B. M. Badruzzaman, Test-in-Charge
Dept. of Civil Engg., BUET

Test performed by:
Dr. Abu Siddique
Professor, Dept. of Civil Engg.

*Important Note: Samples as supplied to us have been tested. BRTC does not have any responsibility as to the representative character of the samples required to be tested. It is recommended that the samples are sent in a secure and sealed cover/packet/container under the signature of a competent authority. In order to avoid fradulent fabrication of test results, this report has been printed on a security paper. It is also recommended that the test results be collected by a duly authorized person.*

# BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY (BUET)
## DEPARTMENT OF CIVIL ENGINEERING

Mobile: 01819557964; PABX: (8802) - 55167100, 55167228-57 Ext. 7226, Info: http://brtc.ce.buet.ac.bd/#/home, Report verification: http://verify.ce.buet.ac.bd

BRTC Bureau of Research Testing & Consultation

BUETCE 0388409

## STRENGTH OF MATERIALS LABORATORY

**TEST OF DEFORMED M.S. BARS [ASTM A 615M-16]**

Sent by: জনাব মীর্জা মোঃ ইফতেখার আলী, নির্বাহী প্রকৌশলী
এলজিইডি, কুমিল্লা

Project: "ঘূর্ণিঝড় আম্পান ও বন্যায় ক্ষতিগ্রস্থ পল্লি সড়ক অবকাঠামো পুনর্বাসন শীর্ষক প্রকল্প" এর আওতায় কুমিল্লা জেলার চান্দিনা উপজেলাধীন হোসাইন - কনগাই - গোল্লাই ইউপিসি সড়কে প্রটেক্টিভ ওয়াল নির্মাণ (Package No CAFDRIRP/CUM/UNR/W-42)

**BRTC No.: 1102-75731/CE/22-23; Dt. 13/11/2022**
Ref.: 46.02.1900.000.99..060.22.6919; Dt. 9/11/2022
Date of Test: 14/11/2022
Contractor/supplier: মেসার্স নিউ মুন্সি এন্টারপ্রাইজ
**Samples were received in SEALED condition.**

| Sl. No. | Frog Mark / Identification | Bar Desig./ Nominal dia. | Actual bar dia. | Unit Weight | Average Unit Weight | Yield or Proof Load | Yield or Proof Strength | Average Yield or Proof Strength (YS) | Tensile Load | Tensile Strength | Average Tensile Strength (TS) | TS/YS | Elongation (%) (G. length = 200 mm) | Average Elongation (%) | Bend Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | mm | mm | kg/m | kg/m | kN | MPa | MPa | kN | MPa | MPa | | | | |
| 1 | SAS XBAR B400 DWR | 12 | 12.1 | 0.902 | | 53.4 | 472 | 478 | 74.7 | 660 | 645 | | 18 | | - |
| 2 | SAS XBAR B400 DWR | 12 | 12.0 | 0.889 | 0.893 | 58.5 | 515 | (69500 psi) | 70.7 | 625 | (93500 psi) | 1.35 | 16 | 17 | - |
| 3 | SAS XBAR B400 DWR | 12 | 12.0 | 0.888 | | 50.3 | 445 | | 72.7 | 645 | | | 18 | | - |
| 4 | SAS XBAR 400+ | 8 | 8.2 | 0.419 | | 22.1 | 440 | 457 | 29.2 | 580 | 590 | | 17 | | - |
| 5 | SAS XBAR 400+ | 8 | 8.3 | 0.422 | 0.424 | 22.6 | 448 | (66500 psi) | 29.2 | 580 | (86000 psi) | 1.29 | 16 | 16 | - |
| 6 | SAS XBAR 400+ | 8 | 8.4 | 0.430 | | 24.3 | 484 | | 31 | 615 | | | 16 | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |

**ASTM A615M-16 Weight Requirements and Nominal Area of bars (Table A1.1)**

| Bar desig./Nominal dia., mm | 8 | 10 | 12 | 16 | 20 | 22 | 25 | 28 | 32 | 36 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal area, sq.mm | 50.3 | 79 | 113 | 201 | 314 | 380 | 491 | 616 | 804 | 1018 | 1257 | 1963 | 2827 |
| Nominal weight, kg/m | 0.395 | 0.617 | 0.888 | 1.578 | 2.466 | 2.98 | 3.853 | 4.834 | 6.313 | 7.99 | 9.865 | 15.41 | 22.2 |

Measured unit weight shall not be less than 94% of the nominal weight. 8mm bar size is not covered in ASTM A615M-16.
Area and weight of 8mm and 22m dia. bars are derived based on principle follwed for other sizes in Table A1.1
Actual dia. and TS/YS ratio are provided for informative purpose only. These are not requirements of ASTM A615M-16.
Actual diameter is the diameter of a perfectly round plain bar having same mass per unit length.

Conversion factor: 1.0 MPa = 1.0 N/mm$^2$ = 145 psi. Strengths are based on nominal area.

**ASTM A615M-16 Tensile Requirements for Common Steel Grades**

| | Grade 60 [420] | Grade 75 [520] | Grade 80 [550] |
|---|---|---|---|
| Tensile strength, min. psi [MPa] | 90 000 [620] | 100 000 [690] | 105 000 [725] |
| Yield strength, min, psi [MPa] | 60 000 [420] | 75 000 [520] | 80 000 [550] |
| Elongation in 8 in. [200 mm], min, % | | | |
| Bar Designation No. | | | |
| 10, 12, 16, 20 | 9 | 7 | 7 |
| 25, 22 | 8 | 7 | 7 |
| 28, 32, 36, 40, 50, 60 | 7 | 6 | 6 |

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Department of Civil Engineering, BUET, Dhaka-1000, Bangladesh

15 November 2022

Counter signed by:
Prof. Dr. A. B. M. Badruzzaman, Test-in-Charge
Dept. of Civil Engg., BUET

Test performed by:
Dr. Abu Siddique
Professor, Dept. of Civil Engg.

***Important Note:*** *Samples as supplied to us have been tested. BRTC does not have any responsibility as to the representative character of the samples required to be tested. It is recommended that the samples are sent in a secure and sealed cover/packet/container under the signature of a competent authority. In order to avoid fradulent fabrication of test results, this report has been printed on a security paper. It is also recommended that the test results be collected by a duly authorized person.*

# BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY (BUET)

## DEPARTMENT OF CIVIL ENGINEERING

Mobile: 01819557964; PABX: (8802) - 55167100, 55167228-57 Ext. 7226, Info: http://brtc.ce.buet.ac.bd/#/home, Report verification: http://verify.ce.buet.ac.bd

BRTC Bureau of Research, Testing & Consultation

BUETCE 038846B

## STRENGTH OF MATERIALS LABORATORY

### TEST OF DEFORMED M.S. BARS [ASTM A 615M-16]

Sent by: জনাব মীর্জা মোঃ ইফতেখার আলী, নির্বাহী প্রকৌশলী
এলজিইডি, কুমিল্লা

Project: "ঘূর্ণিঝড় আম্পান ও বন্যায় ক্ষতিগ্রস্থ পল্লি সড়ক অবকাঠামো পুনর্বাসন শীর্ষক প্রকল্প" এর আওতায় কুমিল্লা জেলার মনোহরগঞ্জ উপজেলাধীন তালতলা -রক্তমন্দারহাট ভায়া নরপাইয়া সড়কে প্রটেক্টিভ ওয়াল নির্মাণ (Package NoCAFDRIRP/CUM/VR/W-12)

BRTC No.: 1102-75730/CE/22-23; Dt. 13/11/2022
Ref.: 46.02.1900.000.99..060.22.6915; Dt. 9/11/2022
Date of Test: 14/11/2022
Contractor/supplier: মেসার্স হাই এন্ড কোং এন্ড মাস্টার এন্টারপ্রাইজ

**Samples were received in SEALED condition.**

| Sl. No. | Frog Mark / Identification | Bar Desig./ Nominal dia. | Actual bar dia. | Unit Weight | Average Unit Weight | Yield or Proof Load | Yield or Proof Strength | Average Yield or Proof Strength (YS) | Tensile Load | Tensile Strength | Average Tensile Strength (TS) | TS/YS | Elongation (%) (G. length = 200 mm) | Average Elongation (%) | Bend Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | mm | mm | kg/m | kg/m | kN | MPa | MPa | kN | MPa | MPa | | | | |
| 1 | SAS XBAR B420 DWR | 12 | 12.1 | 0.898 | 0.915 | 49.5 | 438 | 446 (64500 psi) | 69.9 | 620 | 630 (91000 psi) | 1.41 | 18 | 18 | - |
| 2 | SAS XBAR B420 DWR | 12 | 12.1 | 0.902 | | 50.9 | 450 | | 70.8 | 625 | | | 18 | | - |
| 3 | SAS XBAR B420 DWR | 12 | 12.4 | 0.944 | | 50.9 | 450 | | 72.5 | 640 | | | 17 | | - |
| 4 | SAS XBAR 400+ | 8 | 8.5 | 0.441 | 0.431 | 23.9 | 475 | 457 (66500 psi) | 31.4 | 625 | 600 (87000 psi) | 1.31 | 17 | 17 | - |
| 5 | SAS XBAR 400+ | 8 | 8.3 | 0.426 | | 22.1 | 440 | | 29.2 | 580 | | | 16 | | - |
| 6 | SAS XBAR 400+ | 8 | 8.3 | 0.426 | | 23 | 457 | | 30.1 | 600 | | | 17 | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | - | - | - | | | - | | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | - | - | - | | | - | | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | - | - | - | | | - | | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |

ASTM A615M-16 Weight Requirements and Nominal Area of bars (Table A1.1)

| Bar desig./Nominal dia., mm | *8* | 10 | 12 | 16 | 20 | *22* | 25 | 28 | 32 | 36 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal area, sq.mm | *50.3* | 79 | 113 | 201 | 314 | *380* | 491 | 616 | 804 | 1018 | 1257 | 1963 | 2827 |
| Nominal weight, kg/m | *0.395* | 0.617 | 0.888 | 1.578 | 2.466 | *2.98* | 3.853 | 4.834 | 6.313 | 7.99 | 9.865 | 15.41 | 22.2 |

Measured unit weight shall not be less than 94% of the nominal weight. 8mm bar size is not covered in ASTM A615M-16.
Area and weight of 8mm and 22m dia. bars are derived based on principle follwed for other sizes in Table A1.1
Actual dia. and TS/YS ratio are provided for informative purpose only. These are not requirements of ASTM A615M-16.
Actual diameter is the diameter of a perfectly round plain bar having same mass per unit length.

Conversion factor: 1.0 MPa = 1.0 N/mm$^2$ = 145 psi. Strengths are based on nominal area.

ASTM A615M-16 Tensile Requirements for Common Steel Grades

| | Grade 60 [420] | Grade 75 [520] | Grade 80 [550] |
|---|---|---|---|
| Tensile strength, min. psi [MPa] | 90 000 [620] | 100 000 [690] | 105 000 [725] |
| Yield strength, min, psi [MPa] | 60 000 [420] | 75 000 [520] | 80 000 [550] |
| Elongation in 8 in. [200 mm], min, % | | | |
| Bar Designation No. | | | |
| 10, 12, 16, 20 | 9 | 7 | 7 |
| 25, 22 | 8 | 7 | 7 |
| 28, 32, 36, 40, 50, 60 | 7 | 6 | 6 |

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Department of Civil Engineering, BUET, Dhaka-1000, Bangladesh

17 November 2022

Countersigned by:
Prof. Dr. A. B. M. Badruzzaman, Test-in-Charge
Dept. of Civil Engg., BUET

Test performed by:
Dr. Abu Siddique
Professor, Dept. of Civil Engg.

*Important Note: Samples as supplied to us have been tested. BRTC does not have any responsibility as to the representative character of the samples required to be tested. It is recommended that the samples are sent in a secure and sealed cover/packet/container under the signature of a competent authority. In order to avoid fradulent fabrication of test results, this report has been printed on a security paper. It is also recommended that the test results be collected by a duly authorized person.*

# BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY (BUET)
## DEPARTMENT OF CIVIL ENGINEERING

Mobile: 01819557964; PABX: (8802) - 55167100, 55167228-57 Ext. 7226, Info: http://brtc.ce.buet.ac.bd/#/home, Report verification: http://verify.ce.buet.ac.bd

BRTC Bureau of Research, Testing & Consultation

BUETCE 0388408

## STRENGTH OF MATERIALS LABORATORY

**TEST OF DEFORMED M.S. BARS [ASTM A 615M-16]**

Sent by: জনাব মীর্জা মোঃ ইফতেখার আলী, নির্বাহী প্রকৌশলী
এলজিইডি, কুমিল্লা

Project: "কুমিল্লা, ব্রাহ্মণবাড়ীয়া ও চাঁদপুর জেলার গুরুত্বপূর্ণ গ্রামীণ অবকাঠামো উন্নয়ন প্রকল্প"এর আওতায় কুমিল্লা জেলার মনোহরগঞ্জ উপজেলাধীন ভালতলা পাকা সড়ক কাদ্রা ভায়া নরপাইয়া এবং বাদুয়ারা - হাওড়া এন্ড হাসনাবাদ বাজার কৃষি ব্যাংক সড়কে ইউডেন ও প্রটেক্টিভ ওয়াল নির্মাণ (Package NoCCB/C/W-61)

BRTC No.: 1102-75730/CE/22-23; Dt. 13/11/2022
Ref.: 46.02.1900.000.99..060.22.6914; Dt. 9/11/2022
Date of Test: 14/11/2022
Contractor/supplier: মেসার্স আহম্মেদ এন্টারপ্রাইজ

**Samples were received in SEALED condition.**

| Sl. No. | Frog Mark / Identification | Bar Desig./ Nominal dia. | Actual bar dia. | Unit Weight | Average Unit Weight | Yield or Proof Load | Yield or Proof Strength | Average Yield or Proof Strength (YS) | Tensile Load | Tensile Strength | Average Tensile Strength (TS) | TS/YS | Elongation (%) (G. length = 200 mm) | Average Elongation (%) | Bend Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | mm | mm | kg/m | kg/m | kN | MPa | MPa | kN | MPa | MPa | | | | |
| 1 | SAS XBAR B500 DWR | 12 | 12.1 | 0.900 | | 64.1 | 570 | 555 | 78.7 | 695 | 665 | | 15 | | - |
| 2 | SAS XBAR B500 DWR | 12 | 12.1 | 0.898 | 0.899 | 64.6 | 570 | (80500 psi) | 77 | 680 | (96500 psi) | 1.20 | 15 | 15 | - |
| 3 | SAS XBAR B500 DWR | 12 | 12.1 | 0.900 | | 59.7 | 530 | | 69.9 | 620 | | | 14 | | - |
| 4 | SAS XBAR 400+ | 8 | 8.4 | 0.433 | | 23.9 | 475 | - | 30.5 | 605 | 605 | | 17 | | - |
| 5 | SAS XBAR 400+ | 8 | 8.5 | 0.451 | 0.433 | 25.7 | 510 | - | 32.7 | 650 | (87500 psi) | - | 18 | 17 | - |
| 6 | SAS XBAR 400+ | 8 | 8.2 | 0.416 | | 20.8 | 413 | | 27.9 | 555 | | | 17 | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |

**ASTM A615M-16 Weight Requirements and Nominal Area of bars (Table A1.1)**

| Bar desig./Nominal dia., mm | 8 | 10 | 12 | 16 | 20 | 22 | 25 | 28 | 32 | 36 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal area, sq.mm | 50.3 | 79 | 113 | 201 | 314 | 380 | 491 | 616 | 804 | 1018 | 1257 | 1963 | 2827 |
| Nominal weight, kg/m | 0.395 | 0.617 | 0.888 | 1.578 | 2.466 | 2.98 | 3.853 | 4.834 | 6.313 | 7.99 | 9.865 | 15.41 | 22.2 |

Measured unit weight shall not be less than 94% of the nominal weight. 8mm bar size is not covered in ASTM A615M-16.
Area and weight of 8mm and 22m dia. bars are derived based on principle follwed for other sizes in Table A1.1
Actual dia. and TS/YS ratio are provided for informative purpose only. These are not requirements of ASTM A615M-16.
Actual diameter is the diameter of a perfectly round plain bar having same mass per unit length.

Conversion factor: 1.0 MPa = 1.0 N/mm² = 145 psi. Strengths are based on nominal area.

**ASTM A615M-16 Tensile Requirements for Common Steel Grades**

| | Grade 60 [420] | Grade 75 [520] | Grade 80 [550] |
|---|---|---|---|
| Tensile strength, min. psi [MPa] | 90 000 [620] | 100 000 [690] | 105 000 [725] |
| Yield strength, min, psi [MPa] | 60 000 [420] | 75 000 [520] | 80 000 [550] |
| Elongation in 8 in. [200 mm], min, % | | | |
| Bar Designation No. | | | |
| 10, 12, 16, 20 | 9 | 7 | 7 |
| 25, 22 | 8 | 7 | 7 |
| 28, 32, 36, 40, 50, 60 | 7 | 6 | 6 |

103
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Department of Civil Engineering, BUET, Dhaka-1000, Bangladesh

15 November 2022

Countersigned by:
Prof. Dr. A. B. M. Badruzzaman, Test-in-Charge
Dept. of Civil Engg., BUET

Test performed by:
Dr. Abu Siddique
Professor, Dept. of Civil Engg.

*Important Note: Samples as supplied to us have been tested. BRTC does not have any responsibility as to the representative character of the samples required to be tested. It is recommended that the samples are sent in a secure and sealed cover/packet/container under the signature of a competent authority. In order to avoid fradulent fabrication of test results, this report has been printed on a security paper. It is also recommended that the test results be collected by a duly authorized person.*

# BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY (BUET)

## DEPARTMENT OF CIVIL ENGINEERING

Mobile: 01819557964; PABX: (8802) - 55167100, 55167228-57 Ext. 7226, Info: http://brtc.ce.buet.ac.bd/#/home, Report verification: http://verify.ce.buet.ac.bd

BRTC Bureau of Research, Testing & Consultation

BUETCE 038840?

## STRENGTH OF MATERIALS LABORATORY

**TEST OF DEFORMED M.S. BARS [ASTM A 615M-16]**

Sent by: জনাব মীর্জা মোঃ ইফতেখার আলী, নির্বাহী প্রকৌশলী
এলজিইডি, কুমিল্লা

Project: "অগ্রাধিকার ভিত্তিতে গুরুত্বপূর্ণ পল্লি অবকাঠামো উন্নয়ন প্রকল্প-৩" এর আওতায় কুমিল্লা জেলার মনোহরগঞ্জ উপজেলাধীন হাসনাবাদ বাজার-কামার বাড়ী ব্রীজ মাল্লান চেয়ারম্যান বাড়ী সড়কে প্রটেক্টিভ ওয়াল নির্মান (Package No-IRIDP-3/CUM/MW86)

**BRTC No.: 1102-75730/CE/22-23; Dt. 13/11/2022**
Ref.: 46.02.1900.000.99..060.22.6913; Dt. 9/11/2022
Date of Test: 14/11/2022
Contractor/supplier: মেসার্স শান্তা এন্টারপ্রাইজ
**Samples were received in SEALED condition.**

| Sl. No. | Frog Mark / Identification | Bar Desig./ Nominal dia. | Actual bar dia. | Unit Weight | Average Unit Weight | Yield or Proof Load | Yield or Proof Strength | Average Yield or Proof Strength (YS) | Tensile Load | Tensile Strength | Average Tensile Strength (TS) | TS/YS | Elongation (%) (G. length = 200 mm) | Average Elongation (%) | Bend Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | mm | mm | kg/m | kg/m | kN | MPa | MPa | kN | MPa | MPa | | | | |
| 1 | SAS XBAR B420 DWR | 12 | 12.1 | 0.899 | | 48.7 | 431 | 434 | 69.6 | 615 | 625 | | 16 | | - |
| 2 | SAS XBAR B420 DWR | 12 | 12.1 | 0.902 | 0.903 | 49.1 | 434 | (63000 psi) | 70.8 | 625 | (90500 psi) | 1.44 | 17 | 17 | - |
| 3 | SAS XBAR B420 DWR | 12 | 12.1 | 0.907 | | 49.5 | 438 | | 70.8 | 625 | | | 17 | | - |
| 4 | SAS XBAR B500 DWR | 10 | 10.2 | 0.640 | | 42.5 | 535 | - | 50.4 | 640 | 635 | | 16 | | - |
| 5 | SAS XBAR B500 DWR | 10 | 10.2 | 0.647 | 0.639 | 42.6 | 540 | - | 50.4 | 640 | (92000 psi) | - | 16 | 16 | - |
| 6 | SAS XBAR B500 DWR | 10 | 10.1 | 0.629 | | 35.4 | 448 | | 49.5 | 625 | | | 16 | | - |
| 7 | SAS XBAR 400+ | 8 | 8.3 | 0.427 | | 23.9 | 475 | 454 | 31.4 | 625 | 595 | | 17 | | - |
| 8 | SAS XBAR 400+ | 8 | 8.5 | 0.448 | 0.437 | 22.1 | 440 | (66000 psi) | 28.7 | 570 | (86500 psi) | 1.31 | 16 | 16 | - |
| 9 | SAS XBAR 400+ | 8 | 8.4 | 0.436 | | 22.6 | 448 | | 29.6 | 590 | | | 16 | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |

Conversion factor: 1.0 MPa = 1.0 N/mm$^2$ = 145 psi. Strengths are based on nominal area.

**ASTM A615M-16 Weight Requirements and Nominal Area of bars (Table A1.1)**

| Bar desig./Nominal dia., mm | *8* | 10 | 12 | 16 | 20 | *22* | 25 | 28 | 32 | 36 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal area, sq.mm | *50.3* | 79 | 113 | 201 | 314 | *380* | 491 | 616 | 804 | 1018 | 1257 | 1963 | 2827 |
| Nominal weight, kg/m | *0.395* | 0.617 | 0.888 | 1.578 | 2.466 | *2.98* | 3.853 | 4.834 | 6.313 | 7.99 | 9.865 | 15.41 | 22.2 |

Measured unit weight shall not be less than 94% of the nominal weight. 8mm bar size is not covered in ASTM A615M-16.
Area and weight of 8mm and 22m dia. bars are derived based on principle tollwed for other sizes in Table A1.1
Actual dia. and TS/YS ratio are provided for informative purpose only. These are not requirements of ASTM A615M-16.
Actual diameter is the diameter of a perfectly round plain bar having same mass per unit length.

**ASTM A615M-16 Tensile Requirements for Common Steel Grades**

| | Grade 60 [420] | Grade 75 [520] | Grade 80 [550] |
|---|---|---|---|
| Tensile strength, min. psi [MPa] | 90 000 [620] | 100 000 [690] | 105 000 [725] |
| Yield strength, min, psi [MPa] | 60 000 [420] | 75 000 [520] | 80 000 [550] |
| Elongation in 8 in. [200 mm], min, % | | | |
| Bar Designation No. | | | |
| 10, 12, 16, 20 | 9 | 7 | 7 |
| 25, 22 | 8 | 7 | 7 |
| 28, 32, 36, 40, 50, 60 | 7 | 6 | 6 |

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Countersigned by:
Prof. Dr. A. B. M. Badruzzaman, Test-in-Charge
Dept. of Civil Engg., BUET

Department of Civil Engineering, BUET, Dhaka-1000, Bangladesh

15 November 2022

Test performed by:
Dr. Abu Siddique
Professor, Dept. of Civil Engg.

***Important Note:*** *Samples as supplied to us have been tested. BRTC does not have any responsibility as to the representative character of the samples required to be tested. It is recommended that the samples are sent in a secure and sealed cover/packet/container under the signature of a competent authority. In order to avoid fradulent fabrication of test results, this report has been printed on a security paper. It is also recommended that the test results be collected by a duly authorized person.*

# BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY (BUET)
## DEPARTMENT OF CIVIL ENGINEERING

Mobile: 01819557964; PABX: (8802) - 55167100, 55167228-57 Ext. 7226, Info: http://brtc.ce.buet.ac.bd/#/home, Report verification: http://verify.ce.buet.ac.bd

BRTC Bureau of Research, Testing & Consultation

BUETCE 0388402

## STRENGTH OF MATERIALS LABORATORY

**TEST OF DEFORMED M.S. BARS [ASTM A 615M-16]**

Sent by: জনাব মীর্জা মোঃ ইফতেখার আলী, নির্বাহী প্রকৌশলী
এলজিইডি, কুমিল্লা

Project: "অগ্রাধিকার ভিত্তিতে গুরুত্বপূর্ণ পল্লি অবকাঠামো উন্নয়ন প্রকল্প-৩" এর আওতায় কুমিল্লা জেলার বুড়িচং উপজেলাধীন রাজাপুর বাজার - বাকশিমুল খানা সড়কে প্রটেক্টিভ ওয়াল (Package No-IRIDP-3/CUM/DW-52)

**BRTC No.: 1102-75727/CE/22-23; Dt. 13/11/2022**
Ref.: 46.02.1900.000.99..060.22.6761; Dt. 3/11/2022
Date of Test: 14/11/2022
Contractor/supplier: মেসার্স বি এইচ কনস্ট্রাকশন
**Samples were received in SEALED condition.**

| Sl. No. | Frog Mark / Identification | Bar Desig./ Nominal dia. | Actual bar dia. | Unit Weight | Average Unit Weight | Yield or Proof Load | Yield or Proof Strength | Average Yield or Proof Strength (YS) | Tensile Load | Tensile Strength | Average Tensile Strength (TS) | TS/YS | Elongation (%) (G. length = 200 mm) | Average Elongation (%) | Bend Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | mm | mm | kg/m | kg/m | kN | MPa | MPa | kN | MPa | MPa | | | | |
| 1 | ASBRM B500 CWR | 12 | 11.9 | 0.874 | 0.839 | 53.4 | 472 | - | 73.7 | 650 | 650 (94000 psi) | - | 14 | - | - |
| 2 | ASBRM B500 CWR | 12 | 11.5 | 0.822 | | 62.5 | 555 | - | 72.7 | 645 | | | 12 | | - |
| 3 | ASBRM B500 CWR | 12 | 11.5 | 0.820 | | 64.6 | 570 | | 73.7 | 650 | | | 12 | | - |
| 4 | SASMUS TMT B500 CWR | 10 | 9.9 | 0.609 | 0.609 | 44.2 | 560 | 565 (82000 psi) | 52.4 | 665 | 655 (95000 psi) | 1.16 | 11 | - | - |
| 5 | SASMUS TMT B500 CWR | 10 | 9.9 | 0.609 | | 44.2 | 560 | | 51.4 | 650 | | | 11 | | - |
| 6 | SASMUS TMT B500 CWR | 10 | 9.9 | 0.608 | | 45.3 | 575 | | 51.4 | 650 | | | 13 | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | - | - | - | | | - | | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | - | - | - | | | - | | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | - | - | - | | | - | | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |

**ASTM A615M-16 Weight Requirements and Nominal Area of bars (Table A1.1)**

| Bar desig./Nominal dia., mm | 8 | 10 | 12 | 16 | 20 | 22 | 25 | 28 | 32 | 36 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal area, sq.mm | 50.3 | 79 | 113 | 201 | 314 | 380 | 491 | 616 | 804 | 1018 | 1257 | 1963 | 2827 |
| Nominal weight, kg/m | 0.395 | 0.617 | 0.888 | 1.578 | 2.466 | 2.98 | 3.853 | 4.834 | 6.313 | 7.99 | 9.865 | 15.41 | 22.2 |

Measured unit weight shall not be less than 94% of the nominal weight. 8mm bar size is not covered in ASTM A615M-16.
Area and weight of 8mm and 22m dia. bars are derived based on principle follwed for other sizes in Table A1.1
Actual dia. and TS/YS ratio are provided for informative purpose only. These are not requirements of ASTM A615M-16.
Actual diameter is the diameter of a perfectly round plain bar having same mass per unit length.

Conversion factor: 1.0 MPa = 1.0 N/mm$^2$ = 145 psi. Strengths are based on nominal area.

**ASTM A615M-16 Tensile Requirements for Common Steel Grades**

| | Grade 60 [420] | Grade 75 [520] | Grade 80 [550] |
|---|---|---|---|
| Tensile strength, min. psi [MPa] | 90 000 [620] | 100 000 [690] | 105 000 [725] |
| Yield strength, min, psi [MPa] | 60 000 [420] | 75 000 [520] | 80 000 [550] |
| Elongation in 8 in. [200 mm], min, % | | | |
| Bar Designation No. | | | |
| 10, 12, 16, 20 | 9 | 7 | 7 |
| 25, 22 | 8 | 7 | 7 |
| 28, 32, 36, 40, 50, 60 | 7 | 6 | 6 |

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Department of Civil Engineering, BUET, Dhaka-1000, Bangladesh

15 November 2022

Countersigned by:
Prof. Dr. A. B. M. Badruzzaman, Test-in-Charge
Dept. of Civil Engg., BUET

Test performed by:
Dr. Abu Siddique
Professor, Dept. of Civil Engg.

***Important Note:*** *Samples as supplied to us have been tested. BRTC does not have any responsibility as to the representative character of the samples required to be tested. It is recommended that the samples are sent in a secure and sealed cover/packet/container under the signature of a competent authority. In order to avoid fradulent fabrication of test results, this report has been printed on a security paper. It is also recommended that the test results be collected by a duly authorized person.*

# BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY (BUET)
## DEPARTMENT OF CIVIL ENGINEERING

Mobile: 01819557964; PABX: (8802) - 55167100, 55167228-57 Ext. 7226, Info: http://brtc.ce.buet.ac.bd/#/home, Report verification: http://verify.ce.buet.ac.bd

BRTC Bureau of Research, Testing & Consultation

BUETCE 0388405

## STRENGTH OF MATERIALS LABORATORY

**TEST OF DEFORMED M.S. BARS [ASTM A 615M-16]**

Sent by: জনাব মীর্জা মোঃ ইফতেখার আলী, নির্বাহী প্রকৌশলী
এলজিইডি, কুমিল্লা

Project: "উপজেলা শহর (নন-মিউনিসিপ্যাল) মাস্টার প্লান প্রণয়ন ও মৌলিক অবকাঠামো উন্নয়ন প্রকল্প" এর আওতায় কুমিল্লা জেলার মুরাদনগর উপজেলাধীন কোম্পানীগঞ্জ বাজার সড়ক আরসিসি দ্বারা উন্নয়ন (Package No-UTMIDP/MURA/COM/WR-266)

**BRTC No.: 1102-75727/CE/22-23; Dt. 13/11/2022**
Ref.: 46.02.1900.000.99..060.22.6758; Dt. 3/11/2022
Date of Test: 14/11/2022
Contractor/supplier: মেসার্স নিরু এন্ড টেডার্স
**Samples were received in SEALED condition.**

| Sl. No. | Frog Mark / Identification | Bar Desig./ Nominal dia. | Actual bar dia. | Unit Weight | Average Unit Weight | Yield or Proof Load | Yield or Proof Strength | Average Yield or Proof Strength (YS) | Tensile Load | Tensile Strength | Average Tensile Strength (TS) | TS/YS | Elongation (%) (G. length = 200 mm) | Average Elongation (%) | Bend Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | mm | mm | kg/m | kg/m | kN | MPa | MPa | kN | MPa | MPa | | | | |
| 1 | SAS XBAR B420 DWR | 12 | 12.3 | 0.926 | | 51.7 | 458 | 467 | 72.5 | 640 | 650 | | 17 | | - |
| 2 | SAS XBAR B420 DWR | 12 | 12.3 | 0.931 | 0.935 | 53.1 | 470 | (67500 psi) | 73.4 | 650 | (94000 psi) | 1.39 | 18 | 18 | - |
| 3 | SAS XBAR B420 DWR | 12 | 12.4 | 0.949 | | 53.5 | 474 | | 73.9 | 655 | | | 18 | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |

**ASTM A615M-16 Weight Requirements and Nominal Area of bars (Table A1.1)**

| Bar desig./Nominal dia., mm | 8 | 10 | 12 | 16 | 20 | 22 | 25 | 28 | 32 | 36 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal area, sq.mm | 50.3 | 79 | 113 | 201 | 314 | 380 | 491 | 616 | 804 | 1018 | 1257 | 1963 | 2827 |
| Nominal weight, kg/m | 0.395 | 0.617 | 0.888 | 1.578 | 2.466 | 2.98 | 3.853 | 4.834 | 6.313 | 7.99 | 9.865 | 15.41 | 22.2 |

Measured unit weight shall not be less than 94% of the nominal weight. 8mm bar size is not covered in ASTM A615M-16.
Area and weight of 8mm and 22m dia. bars are derived based on principle follwed for other sizes in Table A1.1
Actual dia. and TS/YS ratio are provided for informative purpose only. These are not requirements of ASTM A615M-16.
Actual diameter is the diameter of a perfectly round plain bar having same mass per unit length.

Conversion factor: 1.0 MPa = 1.0 N/mm$^2$ = 145 psi. Strengths are based on nominal area.

**ASTM A615M-16 Tensile Requirements for Common Steel Grades**

| | Grade 60 [420] | Grade 75 [520] | Grade 80 [550] |
|---|---|---|---|
| Tensile strength, min. psi [MPa] | 90 000 [620] | 100 000 [690] | 105 000 [725] |
| Yield strength, min, psi [MPa] | 60 000 [420] | 75 000 [520] | 80 000 [550] |
| Elongation in 8 in. [200 mm], min, % | | | |
| Bar Designation No. | | | |
| 10, 12, 16, 20 | 9 | 7 | 7 |
| 25, 22 | 8 | 7 | 7 |
| 28, 32, 36, 40, 50, 60 | 7 | 6 | 6 |

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Department of Civil Engineering, BUET, Dhaka-1000, Bangladesh

15 November 2022

Countersigned by:
Prof. Dr. A. B. M. Badruzzaman, Test-in-Charge
Dept. of Civil Engg., BUET

Test performed by:
Dr. Abu Siddique
Professor, Dept. of Civil Engg.

***Important Note:*** *Samples as supplied to us have been tested. BRTC does not have any responsibility as to the representative character of the samples required to be tested. It is recommended that the samples are sent in a secure and sealed cover/packet/container under the signature of a competent authority. In order to avoid fradulent fabrication of test results, this report has been printed on a security paper. It is also recommended that the test results be collected by a duly authorized person.*

# BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY (BUET)
## DEPARTMENT OF CIVIL ENGINEERING

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BRTC Bureau of Research, Testing & Consultation

## STRENGTH OF MATERIALS LABORATORY

BUETCE 0388403

**TEST OF DEFORMED M.S. BARS [ASTM A 615M-16]**

Sent by: জনাব মীর্জা মোঃ ইফতেখার আলী, নির্বাহী প্রকৌশলী
এলজিইডি, কুমিল্লা

Project: "কুমিল্লা, ব্রাহ্মণবাড়ীয়া ও চাঁদপুর জেলার গুরুত্বপূর্ণ গ্রামীণ অবকাঠামো উন্নয়ন প্রকল্প"এর আওতায় কুমিল্লা জেলার দাউদকান্দি উপজেলাধীন গৌরিপুর কচুয়া সড়ক - মালাখালা সড়কে প্রটেক্টিভ ওয়াল নির্মাণ (Package No: CCB/C/VR/W-45)

**BRTC No.: 1102-75727/CE/22-23; Dt. 13/11/2022**
Ref.: 46.02.1900.000.99..060.22.6760; Dt. 3/11/2022
Date of Test: 14/11/2022
Contractor/supplier: মেসার্স জে এন্ড এম ইঞ্জিনিয়ারিং
**Samples were received in SEALED condition.**

| Sl. No. | Frog Mark / Identification | Bar Desig./ Nominal dia. | Actual bar dia. | Unit Weight | Average Unit Weight | Yield or Proof Load | Yield or Proof Strength | Average Yield or Proof Strength (YS) | Tensile Load | Tensile Strength | Average Tensile Strength (TS) | TS/YS | Elongation (%) (G. length = 200 mm) | Average Elongation (%) | Bend Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | mm | mm | kg/m | kg/m | kN | MPa | MPa | kN | MPa | MPa | | | | |
| 1 | SAS XBAR B420 DWR | 12 | 12.3 | 0.934 | | 50 | 442 | 434 | 69.9 | 620 | 610 | | 18 | | - |
| 2 | SAS XBAR B420 DWR | 12 | 12.3 | 0.936 | 0.925 | 50 | 442 | (63000 psi) | 69.9 | 620 | (88500 psi) | 1.41 | 19 | 18 | - |
| 3 | SAS XBAR B420 DWR | 12 | 12.1 | 0.905 | | 47.3 | 419 | | 67.2 | 595 | | | 18 | | - |
| 4 | SAS XBAR B400 CWR | 10 | 10.0 | 0.620 | | 33.2 | 420 | 433 | 47.3 | 600 | 610 | | 17 | | - |
| 5 | SAS XBAR B400 CWR | 10 | 10.1 | 0.632 | 0.630 | 34.5 | 437 | (63000 psi) | 48.2 | 610 | (88500 psi) | 1.41 | 17 | 17 | - |
| 6 | SAS XBAR B400 CWR | 10 | 10.2 | 0.639 | | 34.9 | 442 | | 49.1 | 620 | | | 17 | | - |
| 7 | SAS XBAR 400+ | 8 | 8.4 | 0.433 | | 22.6 | 448 | 451 | 30.1 | 600 | 605 | | 17 | | - |
| 8 | SAS XBAR 400+ | 8 | 8.4 | 0.440 | 0.440 | 22.1 | 440 | (65500 psi) | 30.1 | 600 | (88000 psi) | 1.34 | 17 | 17 | - |
| 9 | SAS XBAR 400+ | 8 | 8.5 | 0.448 | | 23.4 | 466 | | 31.4 | 625 | | | 16 | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |

Conversion factor: 1.0 MPa = 1.0 N/mm$^2$ = 145 psi. Strengths are based on nominal area.

**ASTM A615M-16 Weight Requirements and Nominal Area of bars (Table A1.1)**

| Bar desig./Nominal dia., mm | *8* | 10 | 12 | 16 | 20 | *22* | 25 | 28 | 32 | 36 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal area, sq.mm | *50.3* | 79 | 113 | 201 | 314 | *380* | 491 | 616 | 804 | 1018 | 1257 | 1963 | 2827 |
| Nominal weight, kg/m | *0.395* | 0.617 | 0.888 | 1.578 | 2.466 | *2.98* | 3.853 | 4.834 | 6.313 | 7.99 | 9.865 | 15.41 | 22.2 |

Measured unit weight shall not be less than 94% of the nominal weight. 8mm bar size is not covered in ASTM A615M-16.
Area and weight of 8mm and 22m dia. bars are derived based on principle follwed for other sizes in Table A1.1
Actual dia. and TS/YS ratio are provided for informative purpose only. These are not requirements of ASTM A615M-16.
Actual diameter is the diameter of a perfectly round plain bar having same mass per unit length.

**ASTM A615M-16 Tensile Requirements for Common Steel Grades**

| | Grade 60 [420] | Grade 75 [520] | Grade 80 [550] |
|---|---|---|---|
| Tensile strength, min. psi [MPa] | 90 000 [620] | 100 000 [690] | 105 000 [725] |
| Yield strength, min, psi [MPa] | 60 000 [420] | 75 000 [520] | 80 000 [550] |
| Elongation in 8 in. [200 mm], min, % | | | |
| Bar Designation No. | | | |
| 10, 12, 16, 20 | 9 | 7 | 7 |
| 25, 22 | 8 | 7 | 7 |
| 28, 32, 36, 40, 50, 60 | 7 | 6 | 6 |

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Department of Civil Engineering, BUET, Dhaka-1000, Bangladesh

15 November 2022

Countersigned by:
Prof. Dr. A. B. M. Badruzzaman, Test-in-Charge
Dept. of Civil Engg., BUET

Test performed by:
Dr. Abu Siddique
Professor, Dept. of Civil Engg.

*Important Note: Samples as supplied to us have been tested. BRTC does not have any responsibility as to the representative character of the samples required to be tested. It is recommended that the samples are sent in a secure and sealed cover/packet/container under the signature of a competent authority. In order to avoid fradulent fabrication of test results, this report has been printed on a security paper. It is also recommended that the test results be collected by a duly authorized person.*

# BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY (BUET)
## DEPARTMENT OF CIVIL ENGINEERING

Mobile: 01819557964; PABX: (8802) - 55167100, 55167228-57 Ext. 7226, Info: http://brtc.ce.buet.ac.bd/#/home, Report verification: http://verify.ce.buet.ac.bd

BRTC Bureau of Research, Testing & Consultation

## STRENGTH OF MATERIALS LABORATORY

BUETCE 038404

**TEST OF DEFORMED M.S. BARS [ASTM A 615M-16]**

Sent by: জনাব মীর্জা মোঃ ইফতেখার আলী, নির্বাহী প্রকৌশলী
এলজিইডি, কুমিল্লা

Project: "কুমিল্লা, ব্রাহ্মণবাড়ীয়া ও চাঁদপুর জেলার গুরুত্বপূর্ণ গ্রামীণ অবকাঠামো উন্নয়ন প্রকল্প"এর আওতায় কুমিল্লা জেলার মনোহরগঞ্জ উপজেলাধীন লক্ষনপুর হাইস্কুল -শোয়ারী সড়ক ভায়া মান্দারী সড়কে ইউভেন ও প্রটেক্টিভ ওয়াল নির্মাণ (Package NoCCB/C/M-08)

**BRTC No.: 1102-75727/CE/22-23; Dt. 13/11/2022**
Ref.: 46.02.1900.000.99..060.22.6759; Dt. 3/11/2022
Date of Test: 14/11/2022
Contractor/supplier: মেসার্স নাফিসা কনস্ট্রাকশন
**Samples were received in SEALED condition.**

| Sl. No. | Frog Mark / Identification | Bar Desig./ Nominal dia. | Actual bar dia. | Unit Weight | Average Unit Weight | Yield or Proof Load | Yield or Proof Strength | Average Yield or Proof Strength (YS) | Tensile Load | Tensile Strength | Average Tensile Strength (TS) | TS/YS | Elongation (%) (G. length = 200 mm) | Average Elongation (%) | Bend Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | mm | mm | kg/m | kg/m | kN | MPa | MPa | kN | MPa | MPa | | | | |
| 1 | SAS XBAR B420 DWR | 16 | 16.2 | 1.614 | | 90.9 | 452 | 457 | 130 | 645 | 655 | | 18 | | - |
| 2 | SAS XBAR B420 DWR | 16 | 16.2 | 1.617 | 1.636 | 90.9 | 452 | (66500 psi) | 130 | 645 | (95000 psi) | 1.43 | 18 | 18 | - |
| 3 | SAS XBAR B420 DWR | 16 | 16.5 | 1.678 | | 93.9 | 467 | | 137 | 680 | | | 17 | | - |
| 4 | SAS XBAR B420 DWR | 12 | 12.3 | 0.932 | | 52.2 | 462 | 472 | 72.5 | 640 | 665 | | 17 | | - |
| 5 | SAS XBAR B420 DWR | 12 | 12.4 | 0.941 | 0.938 | 54 | 478 | (68500 psi) | 76.1 | 675 | (96000 psi) | 1.41 | 17 | 17 | - |
| 6 | SAS XBAR B420 DWR | 12 | 12.4 | 0.942 | | 54 | 478 | | 76.1 | 675 | | | 16 | | - |
| 7 | SAS XBAR B400 CWR | 10 | 10.2 | 0.637 | | 34.5 | 437 | 440 | 48.7 | 615 | 625 | | 17 | | - |
| 8 | SAS XBAR B400 CWR | 10 | 10.1 | 0.634 | 0.630 | 34.1 | 431 | (64000 psi) | 48.7 | 615 | (90500 psi) | 1.42 | 16 | 16 | - |
| 9 | SAS XBAR B400 CWR | 10 | 10.0 | 0.620 | | 35.8 | 453 | | 50.9 | 645 | | | 15 | | - |
| 10 | SAS XBAR 400+ | 8 | 8.0 | 0.397 | | 19.9 | 396 | 428 | 26.5 | 530 | 570 | | 16 | | - |
| 11 | SAS XBAR 400+ | 8 | 8.3 | 0.426 | 0.415 | 22.1 | 440 | (62000 psi) | 29.6 | 590 | (82500 psi) | 1.33 | 17 | 17 | - |
| 12 | SAS XBAR 400+ | 8 | 8.3 | 0.423 | | 22.6 | 448 | | 29.6 | 590 | | | 17 | | - |
| - | - | - | - | - | | - | - | - | - | - | - | | - | | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | | - | - | | - | - | | | - | | - |

Conversion factor: 1.0 MPa = 1.0 N/mm$^2$ = 145 psi. Strengths are based on nominal area.

**ASTM A615M-16 Weight Requirements and Nominal Area of bars (Table A1.1)**

| Bar desig./Nominal dia., mm | *8* | 10 | 12 | 16 | 20 | *22* | 25 | 28 | 32 | 36 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal area, sq.mm | *50.3* | 79 | 113 | 201 | 314 | *380* | 491 | 616 | 804 | 1018 | 1257 | 1963 | 2827 |
| Nominal weight, kg/m | *0.395* | 0.617 | 0.888 | 1.578 | 2.466 | *2.98* | 3.853 | 4.834 | 6.313 | 7.99 | 9.865 | 15.41 | 22.2 |

Measured unit weight shall not be less than 94% of the nominal weight. 8mm bar size is not covered in ASTM A615M-16.
Area and weight of 8mm and 22m dia. bars are derived based on principle follwed for other sizes in Table A1.1
Actual dia. and TS/YS ratio are provided for informative purpose only. These are not requirements of ASTM A615M-16.
Actual diameter is the diameter of a perfectly round plain bar having same mass per unit length.

**ASTM A615M-16 Tensile Requirements for Common Steel Grades**

| | Grade 60 [420] | Grade 75 [520] | Grade 80 [550] |
|---|---|---|---|
| Tensile strength, min. psi [MPa] | 90 000 [620] | 100 000 [690] | 105 000 [725] |
| Yield strength, min, psi [MPa] | 60 000 [420] | 75 000 [520] | 80 000 [550] |
| Elongation in 8 in. [200 mm], min, % | | | |
| Bar Designation No. | | | |
| 10, 12, 16, 20 | 9 | 7 | 7 |
| 25, 22 | 8 | 7 | 7 |
| 28, 32, 36, 40, 50, 60 | 7 | 6 | 6 |

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15 November 2022

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***Important Note:*** *Samples as supplied to us have been tested. BRTC does not have any responsibility as to the representative character of the samples required to be tested. It is recommended that the samples are sent in a secure and sealed cover/packet/container under the signature of a competent authority. In order to avoid fradulent fabrication of test results, this report has been printed on a security paper. It is also recommended that the test results be collected by a duly authorized person.*