



Client : Engr. Md. Tanjidul Islam  
Sr. Manager, Quality Control  
GPH Ispat Limited

Client's Ref: Nil; 01/02/2024  
BRTC Ref: 1103-16151/MME/2023-24; 05/03/2024  
Sample Condition: Not Sealed

10 March 2024  
MME 1115/2023-2024



5457hlu4hgr

## TEST OF DEFORMED M.S. REBAR (Test Method BDS ISO 6935-2 2021)

| Frog Mark/<br>Identification | Sample No. | Bar<br>Designation/<br>Nominal<br>Diameter,<br>d | Actual<br>Diameter | Mass<br>per<br>Unit<br>Length | Average<br>Unit<br>Weight | Upper<br>Yield<br>Load | Upper<br>Yield<br>Strength,<br>R <sub>elt</sub> | Average<br>Upper<br>Yield<br>Strength | Tensile<br>Load | Tensile<br>Strength,<br>R <sub>m</sub> | Average<br>Tensile<br>Strength | R <sub>m</sub> /<br>R <sub>elt</sub> | Elongati<br>on after<br>Fracture<br>(G.L. 5d) | Average<br>Elongatio<br>n after<br>Fracture,<br>A | Elongation<br>at<br>Maximum<br>Force,<br>A <sub>gt</sub> | Bend Test            | Re-bend<br>Test      |
|------------------------------|------------|--------------------------------------------------|--------------------|-------------------------------|---------------------------|------------------------|-------------------------------------------------|---------------------------------------|-----------------|----------------------------------------|--------------------------------|--------------------------------------|-----------------------------------------------|---------------------------------------------------|----------------------------------------------------------|----------------------|----------------------|
|                              |            | mm                                               | mm                 | kg/m                          | kg/m                      | kN                     | MPa                                             | MPa (psi)                             | kN              | MPa                                    | MPa (psi)                      |                                      | %                                             | %                                                 | %                                                        | (Separate<br>Sample) | (Separate<br>Sample) |
| GPH<br>B500DWR 8             | 1          | 08                                               | 7.99               | 0.393                         | 0.394                     | 27.33                  | 544                                             | 542<br>(78,500)                       | 35.50           | 706                                    | 703<br>(102,000)               | 1.30                                 | 13                                            | 17                                                | 12                                                       | Satisfactory         | Satisfactory         |
|                              | 2          | 08                                               | 7.99               | 0.393                         |                           | 27.14                  | 540                                             |                                       | 34.91           | 695                                    |                                | 1.29                                 | 15                                            |                                                   | 11                                                       | Satisfactory         | Satisfactory         |
|                              | 3          | 08                                               | 8.00               | 0.394                         |                           | 27.25                  | 542                                             |                                       | 35.54           | 707                                    |                                | 1.30                                 | 22                                            |                                                   | 10                                                       | Satisfactory         | Satisfactory         |

Dr. Md. Aminul Islam  
Professor and Head

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Weight Requirements and Nominal Cross-Sectional Area for Steel Rebar (As Per BDS ISO 6935-2 2021 Table 2)

| Bar Designation Number/Nominal Bar Diameter, mm          | 6     | 8     | 10    | 12    | 16   | 20   | 25   | 28   | 32   | 40   |
|----------------------------------------------------------|-------|-------|-------|-------|------|------|------|------|------|------|
| Nominal Mass per Unit Length, kg/m                       | 0.222 | 0.395 | 0.617 | 0.888 | 1.58 | 2.47 | 3.85 | 4.84 | 6.31 | 9.86 |
| Permissible Variation of Nominal Mass per Unit Length, % | ±8    | ±8    | ±6    | ±6    | ±5   | ±5   | ±4   | ±4   | ±4   | ±4   |
| Nominal Cross-Sectional Area, mm <sup>2</sup>            | 28.3  | 50.3  | 78.5  | 113   | 201  | 314  | 491  | 616  | 804  | 1257 |

Please Note: The client supplied the sample and the result given herewith corresponds to the sample tested only. The Department of Materials and Metallurgical Engineering of BUET takes no responsibility regarding the misidentification, if any, of the sample.

Minimum Tensile Requirements for Steel Rebar (As Per BDS ISO 6935-2 2021 Table 6)

| Steel Grade       | Upper Yield Strength |                               | Ductility Properties             |         |                 |
|-------------------|----------------------|-------------------------------|----------------------------------|---------|-----------------|
|                   | R <sub>elt</sub>     |                               | R <sub>m</sub> /R <sub>elt</sub> | A       | A <sub>gt</sub> |
|                   | MPa                  |                               |                                  | %       | %               |
|                   | Minimum              | Maximum                       | Minimum                          | Minimum | Minimum         |
| B400C-R / B400CWR | 400                  | ---                           | 1.15                             | 14      | 7               |
| B500C-R / B500CWR | 500                  | ---                           |                                  | 10      |                 |
| B600C-R           | 600                  | ---                           |                                  | 17      |                 |
| B400DWR           | 400                  | 1.3 × R <sub>elt</sub> (min.) | 1.25                             | 16      | 8               |
| B420DWR           | 420                  |                               |                                  | 13      |                 |
| B500DWR           | 500                  |                               |                                  | 10      |                 |
| B600D-R           | 600                  | 1.2 × R <sub>elt</sub> (min.) |                                  |         |                 |



Client : Engr. Md. Tanjidul Islam  
Sr. Manager, Quality Control  
GPH Ispat Limited

Client's Ref: Nil; 01/02/2024  
BRTC Ref: 1103-16148/MME/2023-24; 05/03/2024  
Sample Condition: Not Sealed

10 March 2024  
MME 1114/2023-2024



7lp0a3uwhp4

## TEST OF DEFORMED M.S. REBAR (Test Method BDS ISO 6935-2 2021)

| Frog Mark/<br>Identification    | Sample No. | Bar<br>Designation/<br>Nominal<br>Diameter,<br>d | Actual<br>Diameter | Mass<br>per<br>Unit<br>Length | Average<br>Unit<br>Weight | Upper<br>Yield<br>Load | Upper<br>Yield<br>Strength,<br>R <sub>EH</sub> | Average<br>Upper<br>Yield<br>Strength | Tensile<br>Load | Tensile<br>Strength,<br>R <sub>m</sub> | Average<br>Tensile<br>Strength | R <sub>m</sub> /<br>R <sub>EH</sub> | Elongation<br>after<br>Fracture<br>(G.L. 5d) | Average<br>Elongation<br>after<br>Fracture,<br>A | Elongation<br>at<br>Maximum<br>Force,<br>A <sub>gt</sub> | Bend Test            | Re-bend<br>Test      |
|---------------------------------|------------|--------------------------------------------------|--------------------|-------------------------------|---------------------------|------------------------|------------------------------------------------|---------------------------------------|-----------------|----------------------------------------|--------------------------------|-------------------------------------|----------------------------------------------|--------------------------------------------------|----------------------------------------------------------|----------------------|----------------------|
|                                 |            | mm                                               | mm                 | kg/m                          | kg/m                      | kN                     | MPa                                            | MPa (psi)                             | kN              | MPa                                    | MPa (psi)                      |                                     | %                                            | %                                                | %                                                        | (Separate<br>Sample) | (Separate<br>Sample) |
| GPH<br>QUANTUM<br>B500DWR<br>10 | 1          | 10                                               | 9.99               | 0.616                         | 0.616                     | 42.61                  | 543                                            | 548<br>(79,500)                       | 54.30           | 691                                    | 694<br>(100,500)               | 1.27                                | 26                                           | 23                                               | 9                                                        | Satisfactory         | Satisfactory         |
|                                 | 2          | 10                                               | 9.99               | 0.616                         |                           | 43.10                  | 549                                            |                                       | 54.49           | 694                                    |                                | 1.26                                | 24                                           |                                                  | 9                                                        | Satisfactory         | Satisfactory         |
|                                 | 3          | 10                                               | 9.99               | 0.615                         |                           | 43.46                  | 553                                            |                                       | 54.77           | 697                                    |                                | 1.26                                | 20                                           |                                                  | 10                                                       | Satisfactory         | Satisfactory         |

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Professor and Head

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| Bar Designation Number/Nominal Bar Diameter, mm          | 6     | 8     | 10    | 12    | 16   | 20   | 25   | 28   | 32   | 40   |
|----------------------------------------------------------|-------|-------|-------|-------|------|------|------|------|------|------|
| Nominal Mass per Unit Length, kg/m                       | 0.222 | 0.355 | 0.617 | 0.886 | 1.56 | 2.47 | 3.85 | 4.84 | 6.31 | 9.86 |
| Permissible Variation of Nominal Mass per Unit Length, % | ±8    | ±8    | ±6    | ±6    | ±5   | ±5   | ±4   | ±4   | ±4   | ±4   |
| Nominal Cross-Sectional Area, mm <sup>2</sup>            | 28.3  | 50.3  | 78.5  | 113   | 201  | 314  | 491  | 616  | 804  | 1257 |

Please Note: The client supplied the sample and the result given herewith corresponds to the sample tested only. The Department of Materials and Metallurgical Engineering of BUET takes no responsibility regarding the misidentification, if any, of the sample.

| Steel Grade       | Upper Yield Strength |                              | Ductility Properties            |         |                 |
|-------------------|----------------------|------------------------------|---------------------------------|---------|-----------------|
|                   | R <sub>EH</sub>      |                              | R <sub>m</sub> /R <sub>EH</sub> | A       | A <sub>gt</sub> |
|                   | MPa                  |                              |                                 | %       | %               |
|                   | Minimum              | Maximum                      | Minimum                         | Minimum | Minimum         |
| B400C-R / B400CWR | 400                  | ---                          | 1.15                            | 14      | 7               |
| B500C-R / B500CWR | 500                  | ---                          |                                 | 10      |                 |
| B600C-R           | 600                  | ---                          |                                 | 17      |                 |
| B400DWR           | 400                  | 1.3 x R <sub>EH</sub> (min.) | 1.25                            | 15      | 8               |
| B420DWR           | 420                  |                              |                                 | 13      |                 |
| B500DWR           | 500                  |                              |                                 | 10      |                 |
| B600D-R           | 600                  | 1.2 x R <sub>EH</sub> (min.) |                                 |         |                 |



Client : Engr. Md. Tanjidul Islam  
Sr. Manager, Quality Control  
GPH Ispat Limited

Client's Ref: Nil; 01/02/2024  
BRTC Ref: 1103-16146/MME/2023-24; 05/03/2024  
Sample Condition: Not Sealed

13 March 2024  
MME 1113/2023-2024



3p35c7urh6w

### TEST OF DEFORMED M.S. REBAR (Test Method BDS ISO 6935-2 2021)

| Bend Test<br>(Separate<br>Sample) | Sample No. | Bar<br>Designation/<br>Nominal<br>Diameter,<br>d | Actual<br>Diameter | Mass<br>per<br>Unit<br>Length | Average<br>Unit<br>Weight | Upper<br>Yield<br>Load | Upper<br>Yield<br>Strength,<br>R <sub>eh</sub> | Average<br>Upper<br>Yield<br>Strength | Tensile<br>Load | Tensile<br>Strength,<br>R <sub>m</sub> | Average<br>Tensile<br>Strength | R <sub>m</sub> /<br>R <sub>eh</sub> | Elongation<br>after<br>Fracture<br>(G.L. 5d) | Average<br>Elongation<br>after<br>Fracture,<br>A | Elongation<br>at<br>Maximum<br>Force,<br>A <sub>gt</sub> | Bend Test            | Rebend Test          |
|-----------------------------------|------------|--------------------------------------------------|--------------------|-------------------------------|---------------------------|------------------------|------------------------------------------------|---------------------------------------|-----------------|----------------------------------------|--------------------------------|-------------------------------------|----------------------------------------------|--------------------------------------------------|----------------------------------------------------------|----------------------|----------------------|
|                                   |            | mm                                               | mm                 | kg/m                          | kg/m                      | kN                     | MPa                                            | MPa (psi)                             | kN              | MPa                                    | MPa (psi)                      |                                     | %                                            | %                                                | %                                                        | (Separate<br>Sample) | (Separate<br>Sample) |
| GPH<br>QUANTUM<br>B500DWR<br>12   | 1          | 12                                               | 11.88              | 0.870                         | 0.868                     | 62.02                  | 560                                            | 565<br>(82000)                        | 79.70           | 719                                    | 723<br>(105000)                | 1.29                                | 23                                           | 24                                               | 11                                                       | Satisfactory         | Satisfactory         |
|                                   | 2          | 12                                               | 11.84              | 0.865                         |                           | 62.40                  | 567                                            |                                       | 79.82           | 725                                    |                                | 1.28                                | 24                                           |                                                  | 13                                                       | Satisfactory         | Satisfactory         |
|                                   | 3          | 12                                               | 11.87              | 0.869                         |                           | 62.80                  | 568                                            |                                       | 80.39           | 726                                    |                                | 1.28                                | 24                                           |                                                  | 11                                                       | Satisfactory         | Satisfactory         |

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Professor and Head

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| Weight Requirements and Nominal Cross-Sectional Area for Steel Rebar (As Per BDS ISO 6935-2 2021 Table 2) |       |       |       |       |      |      |      |      |      |      |
|-----------------------------------------------------------------------------------------------------------|-------|-------|-------|-------|------|------|------|------|------|------|
| Bar Designation Number/Nominal Bar Diameter, mm                                                           | 6     | 8     | 10    | 12    | 16   | 20   | 25   | 28   | 32   | 40   |
| Nominal Mass per Unit Length, kg/m                                                                        | 0.222 | 0.395 | 0.617 | 0.868 | 1.58 | 2.47 | 3.85 | 4.84 | 6.31 | 9.96 |
| Permissible Variation of Nominal Mass per Unit Length, %                                                  | ±8    | ±6    | ±6    | ±6    | ±5   | ±5   | ±4   | ±4   | ±4   | ±4   |
| Nominal Cross-Sectional Area, mm <sup>2</sup>                                                             | 28.3  | 50.3  | 78.5  | 113   | 201  | 314  | 491  | 616  | 804  | 1257 |

Please Note: The client supplied the sample and the result given herewith corresponds to the sample tested only. The Department of Materials and Metallurgical Engineering of BUET takes no responsibility regarding the misidentification, if any, of the sample.

| Minimum Tensile Requirements for Steel Rebar (As Per BDS ISO 6935-2 2021 Table 6) |                      |                              |                                  |         |                 |
|-----------------------------------------------------------------------------------|----------------------|------------------------------|----------------------------------|---------|-----------------|
| Steel Grade                                                                       | Upper Yield Strength |                              | Ductility Properties             |         |                 |
|                                                                                   | R <sub>el</sub>      |                              | R <sub>m</sub> / R <sub>el</sub> | A       | A <sub>gt</sub> |
|                                                                                   | MPa                  |                              |                                  | %       | %               |
|                                                                                   | Minimum              | Maximum                      | Minimum                          | Minimum | Minimum         |
| B400C-R / B400CWR                                                                 | 400                  | ---                          | 1.15                             | 14      | 7               |
| B500C-R / B500CWR                                                                 | 500                  | ---                          |                                  | 10      |                 |
| B600C-R                                                                           | 600                  | ---                          |                                  | 17      |                 |
| B400DWR                                                                           | 400                  | 1.3 x R <sub>el</sub> (min.) | 1.25                             | 16      | 9               |
| B420DWR                                                                           | 420                  |                              |                                  | 13      |                 |
| B500DWR                                                                           | 500                  |                              |                                  | 10      |                 |
| B600D-R                                                                           | 600                  | 1.2 x R <sub>el</sub> (min.) |                                  |         |                 |



Client : Engr. Md. Tanjidul Islam  
Sr. Manager, Quality Control  
GPH Ispat Limited

Client's Ref: Nil; 01/02/2024  
BRTC Ref: 1103-16144/MME/2023-24; 05/03/2024  
Sample Condition: Not Sealed

13 March 2024  
MME 1112/2023-2024



2g2wtku5hvj

### TEST OF DEFORMED M.S. REBAR (Test Method BDS ISO 6935-2 2021)

| Bend Test<br>(Separate<br>Sample) | Sample No. | Bar<br>Designation/<br>Nominal<br>Diameter,<br>d | Actual<br>Diameter | Mass<br>per<br>Unit<br>Length | Average<br>Unit<br>Weight | Upper<br>Yield<br>Load | Upper<br>Yield<br>Strength,<br>ReH | Average<br>Upper<br>Yield<br>Strength | Tensile<br>Load | Tensile<br>Strength,<br>Rm | Average<br>Tensile<br>Strength | Rm/<br>ReH | Elongation<br>after<br>Fracture<br>(G.L. 5d) | Average<br>Elongation<br>after<br>Fracture,<br>A | Elongation<br>at<br>Maximum<br>Force,<br>Ag | Bend Test            | Rebend Test          |
|-----------------------------------|------------|--------------------------------------------------|--------------------|-------------------------------|---------------------------|------------------------|------------------------------------|---------------------------------------|-----------------|----------------------------|--------------------------------|------------|----------------------------------------------|--------------------------------------------------|---------------------------------------------|----------------------|----------------------|
|                                   |            | mm                                               | mm                 | kg/m                          | kg/m                      | kN                     | MPa                                | MPa (psi)                             | kN              | MPa                        | MPa (psi)                      |            | %                                            | %                                                | %                                           | (Separate<br>Sample) | (Separate<br>Sample) |
| GPH<br>QUANTUM<br>B500DWR<br>16   | 1          | 16                                               | 15.82              | 1.543                         | 1.544                     | 107.86                 | 549                                | 553<br>(80000)                        | 138.54          | 705                        | 713<br>(103500)                | 1.28       | 23                                           | 24                                               | 11                                          | Satisfactory         | Satisfactory         |
|                                   | 2          | 16                                               | 15.83              | 1.546                         |                           | 107.26                 | 566                                |                                       | 138.74          | 732                        |                                | 1.29       | 25                                           |                                                  | 12                                          | Satisfactory         | Satisfactory         |
|                                   | 3          | 16                                               | 15.82              | 1.543                         |                           | 106.75                 | 543                                |                                       | 138.13          | 703                        |                                | 1.29       | 24                                           |                                                  | 12                                          | Satisfactory         | Satisfactory         |

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Professor and Head

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Weight Requirements and Nominal Cross-Sectional Area for Steel Rebar (As Per BDS ISO 6935-2 2021 Table 2)

| Bar Designation Number/Nominal Bar Diameter, mm          | 6     | 8     | 10    | 12    | 16   | 20   | 25   | 28   | 32   | 40   |
|----------------------------------------------------------|-------|-------|-------|-------|------|------|------|------|------|------|
| Nominal Mass per Unit Length, kg/m                       | 0.222 | 0.395 | 0.617 | 0.868 | 1.58 | 2.47 | 3.85 | 4.84 | 6.31 | 9.86 |
| Permissible Variation of Nominal Mass per Unit Length, % | ±6    | ±8    | ±6    | ±6    | ±5   | ±5   | ±4   | ±4   | ±4   | ±4   |
| Nominal Cross-Sectional Area, mm <sup>2</sup>            | 28.3  | 50.3  | 78.5  | 113   | 201  | 314  | 491  | 616  | 804  | 1257 |

**Please Note:** The client supplied the sample and the result given herewith corresponds to the sample tested only. The Department of Materials and Metallurgical Engineering of BUET takes no responsibility regarding the misidentification, if any, of the sample.

Minimum Tensile Requirements for Steel Rebar (As Per BDS ISO 6935-2 2021 Table 6)

| Steel Grade       | Upper Yield Strength |                  | Ductility Properties |         |         |
|-------------------|----------------------|------------------|----------------------|---------|---------|
|                   | ReH                  |                  | Rm/ ReH              | A       | Ag      |
|                   | MPa                  |                  |                      | %       | %       |
|                   | Minimum              | Maximum          | Minimum              | Minimum | Minimum |
| B400C-R / B400DWR | 400                  | ---              | 1.15                 | 14      | 7       |
| B500C-R / B500DWR | 500                  | ---              |                      | 14      |         |
| B600C-R           | 600                  | ---              |                      | 10      |         |
| B400DWR           | 400                  | 1.3 x ReH (min.) | 1.25                 | 17      | 8       |
| B420DWR           | 420                  |                  |                      | 16      |         |
| B500DWR           | 500                  |                  |                      | 13      |         |
| B600D-R           | 600                  | 1.2 x ReH (min.) |                      | 10      |         |



Client : Engr. Md. Tanjidul Islam  
Sr. Manager, Quality Control  
GPH Ispat Limited

Client's Ref: Nil; 01/02/2024  
BRTC Ref: 1103-16142/MME/2023-24; 05/03/2024  
Sample Condition: Not Sealed

13 March 2024  
MME 1111/2023-2024



nx69i4unh64

### TEST OF DEFORMED M.S. REBAR (Test Method BDS ISO 6935-2 2021)

| Bend Test<br>(Separate<br>Sample) | Sample No. | Bar<br>Designation/<br>Nominal<br>Diameter,<br>d | Actual<br>Diameter | Mass<br>per<br>Unit<br>Length | Average<br>Unit<br>Weight | Upper<br>Yield<br>Load | Upper<br>Yield<br>Strength,<br>R <sub>eh</sub> | Average<br>Upper<br>Yield<br>Strength | Tensile<br>Load | Tensile<br>Strength,<br>R <sub>m</sub> | Average<br>Tensile<br>Strength | R <sub>m</sub> /<br>R <sub>eh</sub> | Elongation<br>after<br>Fracture<br>(G.L. 5d) | Average<br>Elongation<br>after<br>Fracture,<br>A | Elongation<br>at<br>Maximum<br>Force,<br>A <sub>gt</sub> | Bend Test<br><br>(Separate<br>Sample) | Rebend Test<br><br>(Separate<br>Sample) |
|-----------------------------------|------------|--------------------------------------------------|--------------------|-------------------------------|---------------------------|------------------------|------------------------------------------------|---------------------------------------|-----------------|----------------------------------------|--------------------------------|-------------------------------------|----------------------------------------------|--------------------------------------------------|----------------------------------------------------------|---------------------------------------|-----------------------------------------|
|                                   |            | mm                                               | mm                 | kg/m                          | kg/in                     | kN                     | MPa                                            | MPa (psi)                             | kN              | MPa                                    | MPa (psi)                      |                                     | %                                            | %                                                | %                                                        |                                       |                                         |
| GPH<br>QUANTUM<br>B500DWR<br>20   | 1          | 20                                               | 20.07              | 2.483                         | 2.482                     | 170.65                 | 539                                            | 540<br>(78500)                        | 214.55          | 678                                    | 679<br>(98500)                 | 1.26                                | 24                                           | 24                                               | 12                                                       | Satisfactory                          | Satisfactory                            |
|                                   | 2          | 20                                               | 20.06              | 2.480                         |                           | 171.44                 | 542                                            |                                       | 214.74          | 679                                    |                                | 1.25                                | 24                                           |                                                  | 12                                                       | Satisfactory                          | Satisfactory                            |
|                                   | 3          | 20                                               | 20.07              | 2.483                         |                           | 170.25                 | 538                                            |                                       | 214.65          | 678                                    |                                | 1.26                                | 24                                           |                                                  | 13                                                       | Satisfactory                          | Satisfactory                            |

Dr. Md. Aminul Islam  
Professor and Head

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Weight Requirements and Nominal Cross-Sectional Area for Steel Rebar (As Per BDS ISO 6935-2 2021 Table 2)

| Bar Designation Number/Nominal Bar Diameter, mm          | 5     | 8     | 10    | 12    | 16   | 20   | 25   | 28   | 32   | 40   |
|----------------------------------------------------------|-------|-------|-------|-------|------|------|------|------|------|------|
| Nominal Mass per Unit Length, kg/m                       | 0.222 | 0.395 | 0.617 | 0.888 | 1.58 | 2.47 | 3.85 | 4.84 | 6.31 | 9.86 |
| Permissible Variation of Nominal Mass per Unit Length, % | ±8    | ±8    | ±6    | ±6    | ±5   | ±5   | ±4   | ±4   | ±4   | ±4   |
| Nominal Cross-Sectional Area, mm <sup>2</sup>            | 28.3  | 50.3  | 78.5  | 113   | 201  | 314  | 491  | 616  | 804  | 1257 |

Please Note: The client supplied the sample and the result given herewith corresponds to the sample tested only. The Department of Materials and Metallurgical Engineering of BUET takes no responsibility regarding the misidentification, if any, of the sample.

Minimum Tensile Requirements for Steel Rebar (As Per BDS ISO 6935-2 2021 Table 6)

| Steel Grade       | Upper Yield Strength |                              | Ductility Properties             |         |                 |
|-------------------|----------------------|------------------------------|----------------------------------|---------|-----------------|
|                   | R <sub>eh</sub>      |                              | R <sub>m</sub> / R <sub>eh</sub> | A       | A <sub>gt</sub> |
|                   | MPa                  |                              |                                  | %       | %               |
|                   | Minimum              | Maximum                      | Minimum                          | Minimum | Minimum         |
| B400C-R / B400CWR | 400                  | ---                          | 1.15                             | 14      | 7               |
| B500C-R / B500CWR | 500                  | ---                          |                                  | 10      |                 |
| B600C-R           | 600                  | ---                          |                                  | 17      |                 |
| B400DWR           | 400                  | 1.3 x R <sub>eh</sub> (min.) | 1.25                             | 16      | 8               |
| B420DWR           | 420                  |                              |                                  | 13      |                 |
| B500DWR           | 500                  |                              |                                  | 10      |                 |
| B600D-R           | 600                  | 1.2 x R <sub>eh</sub> (min.) |                                  |         |                 |



Client : Engr. Md. Tanjidul Islam  
Sr. Manager, Quality Control  
GPH Ispat Limited

Client's Ref: Nil; 01/02/2024  
BRTC Ref: 1103-16137/MME/2023-24; 05/03/2024  
Sample Condition: Not Sealed

13 March 2024  
MME 1110/2023-2024



qx09fvuwhev

## TEST OF DEFORMED M.S. REBAR (Test Method BDS ISO 6935-2 2021)

| Bend Test<br>(Separate<br>Sample) | Sample No. | Bar<br>Designation/<br>Nominal<br>Diameter,<br>d | Actual<br>Diameter | Mass<br>per<br>Unit<br>Length | Average<br>Unit<br>Weight | Upper<br>Yield<br>Load | Upper<br>Yield<br>Strength,<br>R <sub>eh</sub> | Average<br>Upper<br>Yield<br>Strength | Tensile<br>Load | Tensile<br>Strength,<br>R <sub>m</sub> | Average<br>Tensile<br>Strength | R <sub>m</sub> /<br>R <sub>eh</sub> | Elongation<br>after<br>Fracture<br>(G.L. 5d) | Average<br>Elongation<br>after<br>Fracture,<br>A | Elongation<br>at<br>Maximum<br>Force,<br>A <sub>gt</sub> | Bend Test<br><br>(Separate<br>Sample) | Rebend<br>Test<br><br>(Separate<br>Sample) |
|-----------------------------------|------------|--------------------------------------------------|--------------------|-------------------------------|---------------------------|------------------------|------------------------------------------------|---------------------------------------|-----------------|----------------------------------------|--------------------------------|-------------------------------------|----------------------------------------------|--------------------------------------------------|----------------------------------------------------------|---------------------------------------|--------------------------------------------|
|                                   |            | mm                                               | mm                 | kg/m                          | kg/m                      | kN                     | MPa                                            | MPa (psi)                             | kN              | MPa                                    | MPa (psi)                      |                                     | %                                            | %                                                | %                                                        |                                       |                                            |
| GPH<br>QUANTUM<br>B500DWR<br>22   | 1          | 22                                               | 21.95              | 2.971                         | 2.968                     | 214.01                 | 566                                            | 563<br>(81500)                        | 279.08          | 738                                    | 735<br>(106000)                | 1.30                                | 21                                           | 20                                               | 11                                                       | Satisfactory                          | Satisfactory                               |
|                                   | 2          | 22                                               | 21.93              | 2.966                         |                           | 212.68                 | 563                                            |                                       | 277.86          | 736                                    |                                | 1.31                                | 19                                           |                                                  | 11                                                       | Satisfactory                          | Satisfactory                               |
|                                   | 3          | 22                                               | 21.94              | 2.967                         |                           | 212.23                 | 561                                            |                                       | 276.87          | 732                                    |                                | 1.30                                | 19                                           |                                                  | 13                                                       | Satisfactory                          | Satisfactory                               |

Dr. Md. Aminul Islam  
Professor and Head

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Weight Requirements and Nominal Cross-Sectional Area for Steel Rebar (As Per BDS ISO 6935-2 2021 Table 2)

| Bar Designation Number/Nominal Bar Diameter, mm          | 6     | 8     | 10    | 12    | 16   | 20   | 25   | 28   | 32   | 40   |
|----------------------------------------------------------|-------|-------|-------|-------|------|------|------|------|------|------|
| Nominal Mass per Unit Length, kg/m                       | 0.222 | 0.395 | 0.617 | 0.868 | 1.58 | 2.47 | 3.95 | 4.84 | 6.31 | 9.86 |
| Permissible Variation of Nominal Mass per Unit Length, % | ±8    | ±6    | ±6    | ±6    | ±5   | ±5   | ±4   | ±4   | ±4   | ±4   |
| Nominal Cross-Sectional Area, mm <sup>2</sup>            | 28.3  | 50.3  | 78.5  | 113   | 201  | 314  | 491  | 616  | 804  | 1257 |

Minimum Tensile Requirements for Steel Rebar (As Per BDS ISO 6935-2 2021 Table 6)

| Steel Grade       | Upper Yield Strength |                              | Ductility Properties             |                              |                |
|-------------------|----------------------|------------------------------|----------------------------------|------------------------------|----------------|
|                   | R <sub>yk</sub>      |                              | R <sub>m</sub> / R <sub>yk</sub> | A                            | A <sub>g</sub> |
|                   | MPa                  |                              |                                  | %                            | %              |
|                   | Minimum              | Maximum                      | Minimum                          | Minimum                      | Minimum        |
| B400C-R / B400CWR | 400                  | ---                          | 1.15                             | 14                           | 7              |
| B500C-R / B500CWR | 500                  | ---                          |                                  | 10                           |                |
| B600C-R           | 600                  | ---                          |                                  | 17                           |                |
| B400DWR           | 400                  | 1.3 x R <sub>yk</sub> (min.) | 1.25                             | 16                           | 8              |
| B420DWR           | 420                  |                              |                                  | 13                           |                |
| B500DWR           | 500                  |                              |                                  | 1.2 x R <sub>yk</sub> (min.) |                |
| B600D-R           | 600                  |                              |                                  |                              |                |

Please Note: The client supplied the sample and the result given herewith corresponds to the sample tested only. The Department of Materials and Metallurgical Engineering of BUET takes no responsibility regarding the misidentification, if any, of the sample.



Client : Engr. Md. Tanjidul Islam  
Sr. Manager, Quality Control  
GPH Ispat Limited

Client's Ref: Nil; 01/02/2024  
BRTC Ref: 1103-16136/MME/2023-24; 05/03/2024  
Sample Condition: Not Sealed

11 March 2024  
MME 1109/2023-2024



0rqkujuehv3

### TEST OF DEFORMED M.S. REBAR (Test Method BDS ISO 6935-2 2021)

| Bend Test<br>(Separate Sample)  | Sample No. | Bar Designation/<br>Nominal Diameter, d | Actual Diameter | Mass per Unit Length | Average Unit Weight | Upper Yield Load | Upper Yield Strength, $R_{eH}$ | Average Upper Yield Strength | Tensile Load | Tensile Strength, $R_m$ | Average Tensile Strength | $R_m/R_{eH}$ | Elongation after Fracture (G.L. 5d) | Average Elongation after Fracture, A | Elongation at Maximum Force, $A_{gt}$ | Bend Test<br>(Separate Sample) | Re-bend Test<br>(Separate Sample) |
|---------------------------------|------------|-----------------------------------------|-----------------|----------------------|---------------------|------------------|--------------------------------|------------------------------|--------------|-------------------------|--------------------------|--------------|-------------------------------------|--------------------------------------|---------------------------------------|--------------------------------|-----------------------------------|
|                                 |            | mm                                      | mm              | kg/m                 | kg/m                | kN               | MPa                            | MPa (psi)                    | kN           | MPa                     | MPa (psi)                |              | %                                   | %                                    | %                                     |                                |                                   |
| GPH<br>QUANTUM<br>B500DWR<br>25 | 1          | 25                                      | 25.08           | 3.878                | 3.874               | 269.38           | 549                            | 545<br>(79000)               | 344.36       | 702                     | 701<br>(101500)          | 1.28         | 21                                  | 21                                   | 10                                    | Satisfactory                   | Satisfactory                      |
|                                 | 2          | 25                                      | 25.07           | 3.874                |                     | 266.34           | 543                            |                              | 344.21       | 701                     |                          | 1.29         | 22                                  |                                      | 13                                    | Satisfactory                   | Satisfactory                      |
|                                 | 3          | 25                                      | 25.06           | 3.871                |                     | 266.05           | 542                            |                              | 343.34       | 699                     |                          | 1.29         | 19                                  |                                      | 10                                    | Satisfactory                   | Satisfactory                      |

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Professor and Head

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Weight Requirements and Nominal Cross-Sectional Area for Steel Rebar (As Per BDS ISO 6935-2 2021 Table 2)

| Bar Designation Number/Nominal Bar Diameter, mm          | 6     | 8     | 10    | 12    | 16   | 20   | 25   | 28   | 32   | 40   |
|----------------------------------------------------------|-------|-------|-------|-------|------|------|------|------|------|------|
| Nominal Mass per Unit Length, kg/m                       | 0.222 | 0.395 | 0.617 | 0.888 | 1.58 | 2.47 | 3.85 | 4.84 | 6.31 | 9.86 |
| Permissible Variation of Nominal Mass per Unit Length, % | ±8    | ±8    | ±6    | ±6    | ±5   | ±5   | ±4   | ±4   | ±4   | ±4   |
| Nominal Cross-Sectional Area, mm <sup>2</sup>            | 28.3  | 50.3  | 78.5  | 113   | 201  | 314  | 491  | 616  | 804  | 1257 |

**Please Note:** The client supplied the sample and the result given herewith corresponds to the sample tested only. The Department of Materials and Metallurgical Engineering of BUET takes no responsibility regarding the misidentification, if any, of the sample.

Minimum Tensile Requirements for Steel Rebar (As Per BDS ISO 6935-2 2021 Table 6)

| Steel Grade       | Upper Yield Strength |                       | Ductility Properties |         |          |
|-------------------|----------------------|-----------------------|----------------------|---------|----------|
|                   | $R_{eH}$             |                       | $R_m/R_{eH}$         | A       | $A_{gt}$ |
|                   | MPa                  |                       |                      | %       | %        |
|                   | Minimum              | Maximum               | Minimum              | Minimum | Minimum  |
| B400C-R / B400CWR | 400                  | ---                   | 1.15                 | 14      | 7        |
| B500C-R / B500CWR | 500                  | ---                   |                      | 10      |          |
| B600C-R           | 600                  | ---                   |                      | 17      |          |
| B400DWR           | 400                  | 1.3 x $R_{eH}$ (min.) | 1.25                 | 16      | 8        |
| B420DWR           | 420                  |                       |                      | 13      |          |
| B500DWR           | 500                  |                       |                      | 10      |          |
| B600D-R           | 600                  | 1.2 x $R_{eH}$ (min.) |                      |         |          |



Client : Engr. Md. Tanjidul Islam  
Sr. Manager, Quality Control  
GPH Ispat Limited

Client's Ref: Nil; 01/02/2024  
BRTC Ref: 1103-16134/MME/2023-24; 05/03/2024  
Sample Condition: Not Sealed

11 March 2024  
MME 1108/2023-2024



we5wb7uzh7g

### TEST OF DEFORMED M.S. REBAR (Test Method BDS ISO 6935-2 2021)

| Bend Test<br>(Separate Sample) | Sample No. | Bar Designation/<br>Nominal Diameter, d | Actual Diameter | Mass per Unit Length | Average Unit Weight | Upper Yield Load | Upper Yield Strength, $R_{eH}$ | Average Upper Yield Strength | Tensile Load | Tensile Strength, $R_m$ | Average Tensile Strength | $R_m/R_{eH}$ | Elongation after Fracture (G.L. 5d) | Average Elongation after Fracture, A | Elongation at Maximum Force, $A_{gt}$ | Bend Test         | Re-bend Test      |
|--------------------------------|------------|-----------------------------------------|-----------------|----------------------|---------------------|------------------|--------------------------------|------------------------------|--------------|-------------------------|--------------------------|--------------|-------------------------------------|--------------------------------------|---------------------------------------|-------------------|-------------------|
|                                |            | mm                                      | mm              | kg/m                 | kg/m                | kN               | MPa                            | MPa (psi)                    | kN           | MPa                     | MPa (psi)                |              | %                                   | %                                    | %                                     | (Separate Sample) | (Separate Sample) |
| GPH<br>B500DWR<br>28           | 1          | 28                                      | 27.87           | 4.790                | 4.797               | 341.82           | 555                            | 560<br>(81000)               | 466.77       | 758                     | 761<br>(110500)          | 1.37         | 20                                  | 19                                   | 10                                    | Satisfactory      | Satisfactory      |
|                                | 2          | 28                                      | 27.94           | 4.813                |                     | 342.50           | 556                            |                              | 467.95       | 760                     |                          | 1.37         | 20                                  |                                      | 12                                    | Satisfactory      | Satisfactory      |
|                                | 3          | 28                                      | 27.87           | 4.789                |                     | 349.23           | 567                            |                              | 470.48       | 764                     |                          | 1.35         | 18                                  |                                      | 10                                    | Satisfactory      | Satisfactory      |

Dr. Md. Aminul Islam  
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| Weight Requirements and Nominal Cross-Sectional Area for Steel Rebar (As Per BDS ISO 6935-2 2021 Table 2) |       |       |       |       |      |      |      |      |      |      |
|-----------------------------------------------------------------------------------------------------------|-------|-------|-------|-------|------|------|------|------|------|------|
| Bar Designation Number/Nominal Bar Diameter, mm                                                           | 6     | 8     | 10    | 12    | 16   | 20   | 25   | 28   | 32   | 40   |
| Nominal Mass per Unit Length, kg/m                                                                        | 0.222 | 0.395 | 0.617 | 0.888 | 1.58 | 2.47 | 3.85 | 4.84 | 6.31 | 9.86 |
| Permissible Variation of Nominal Mass per Unit Length, %                                                  | ±8    | ±8    | ±6    | ±6    | ±5   | ±5   | ±4   | ±4   | ±4   | ±4   |
| Nominal Cross-Sectional Area, mm <sup>2</sup>                                                             | 28.3  | 50.3  | 78.5  | 113   | 201  | 314  | 491  | 616  | 804  | 1257 |

Please Note: The client supplied the sample and the result given herewith corresponds to the sample tested only. The Department of Materials and Metallurgical Engineering of BUET takes no responsibility regarding the misidentification, if any, of the sample.

| Minimum Tensile Requirements for Steel Rebar (As Per BDS ISO 6935-2 2021 Table 6) |                      |                        |                      |         |          |
|-----------------------------------------------------------------------------------|----------------------|------------------------|----------------------|---------|----------|
| Steel Grade                                                                       | Upper Yield Strength |                        | Ductility Properties |         |          |
|                                                                                   | $R_{elt}$            |                        | $R_{m}/R_{elt}$      | A       | $A_{gt}$ |
|                                                                                   | MPa                  |                        |                      | %       | %        |
|                                                                                   | Minimum              | Maximum                | Minimum              | Minimum | Minimum  |
| B400C-R / B500CWR                                                                 | 400                  | ---                    | 1.15                 | 14      | 7        |
| B500C-R / B500CWR                                                                 | 500                  | ---                    |                      | 10      |          |
| B600C-R                                                                           | 600                  | ---                    |                      | 17      |          |
| B400DWR                                                                           | 400                  | 1.3 x $R_{elt}$ (min.) | 1.25                 | 16      | 8        |
| B420DWR                                                                           | 420                  |                        |                      | 13      |          |
| B500DWR                                                                           | 500                  |                        |                      | 10      |          |
| B600D-R                                                                           | 600                  | 1.2 x $R_{elt}$ (min.) |                      |         |          |



Client : Engr. Md. Tanjidul Islam  
Sr. Manager, Quality Control  
GPH Ispat Limited

Client's Ref: Nil; 01/02/2024  
BRTC Ref: 1103-16133/MME/2023-24; 05/03/2024  
Sample Condition: Not Sealed

11 March 2024  
MME 1107/2023-2024



1pg7spu0hge

### TEST OF DEFORMED M.S. REBAR (Test Method BDS ISO 6935-2 2021)

| Bend Test<br>(Separate Sample)  | Sample No. | Bar Designation/<br>Nominal Diameter, d | Actual Diameter | Mass per Unit Length | Average Unit Weight | Upper Yield Load | Upper Yield Strength, $R_{eH}$ | Average Upper Yield Strength | Tensile Load | Tensile Strength, $R_m$ | Average Tensile Strength | $R_m/R_{eH}$ | Elongation after Fracture (G.L. 5d) | Average Elongation after Fracture, A | Elongation at Maximum Force, $A_g$ | Bend Test<br>(Separate Sample) | Re-bend Test<br>(Separate Sample) |
|---------------------------------|------------|-----------------------------------------|-----------------|----------------------|---------------------|------------------|--------------------------------|------------------------------|--------------|-------------------------|--------------------------|--------------|-------------------------------------|--------------------------------------|------------------------------------|--------------------------------|-----------------------------------|
|                                 |            | mm                                      | mm              | kg/m                 | kg/m                | kN               | MPa                            | MPa (psi)                    | kN           | MPa                     | MPa (psi)                |              | %                                   | %                                    | %                                  |                                |                                   |
| GPH<br>QUANTUM<br>B500DWR<br>32 | 1          | 32                                      | 32.00           | 6.311                | 6.315               | 443.24           | 551                            | 550<br>(80000)               | 570.64       | 710                     | 711<br>(103000)          | 1.29         | 20                                  | 19                                   | 11                                 | Satisfactory                   | Satisfactory                      |
|                                 | 2          | 32                                      | 31.99           | 6.308                |                     | 438.32           | 545                            |                              | 570.30       | 709                     |                          | 1.30         | 19                                  |                                      | 9                                  | Satisfactory                   | Satisfactory                      |
|                                 | 3          | 32                                      | 32.03           | 6.326                |                     | 444.73           | 553                            |                              | 573.94       | 714                     |                          | 1.29         | 19                                  |                                      | 11                                 | Satisfactory                   | Satisfactory                      |

Dr. Md. Aminul Islam  
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Weight Requirements and Nominal Cross-Sectional Area for Steel Rebar (As Per BDS ISO 6935-2 2021 Table 2)

| Bar Designation Number/Nominal Bar Diameter, mm          | 6     | 8     | 10    | 12    | 16   | 20   | 25   | 28   | 32   | 40   |
|----------------------------------------------------------|-------|-------|-------|-------|------|------|------|------|------|------|
| Nominal Mass per Unit Length, kg/m                       | 0.222 | 0.395 | 0.617 | 0.868 | 1.58 | 2.47 | 3.85 | 4.84 | 6.31 | 9.86 |
| Permissible Variation of Nominal Mass per Unit Length, % | ±6    | ±6    | ±6    | ±6    | ±5   | ±5   | ±4   | ±4   | ±4   | ±4   |
| Nominal Cross-Sectional Area, mm <sup>2</sup>            | 28.3  | 50.3  | 78.5  | 113   | 201  | 314  | 491  | 616  | 804  | 1257 |

Minimum Tensile Requirements for Steel Rebar (As Per BDS ISO 6935-2 2021 Table 6)

| Steel Grade       | Upper Yield Strength |                       | Ductility Properties |         |         |
|-------------------|----------------------|-----------------------|----------------------|---------|---------|
|                   | $R_{eH}$             |                       | $R_m/R_{eH}$         | A       | $A_g$   |
|                   | MPa                  |                       |                      | %       | %       |
|                   | Minimum              | Maximum               | Minimum              | Minimum | Minimum |
| B400C-R / B400CWR | 400                  | ---                   | 1.15                 | 14      | 7       |
| B500C-R / B500CWR | 500                  | ---                   |                      | 10      |         |
| B600C-R           | 600                  | ---                   |                      | 17      |         |
| B400DWR           | 400                  | 1.3 x $R_{eH}$ (min.) | 1.25                 | 16      | 8       |
| B420DWR           | 420                  |                       |                      | 13      |         |
| B500DWR           | 500                  |                       |                      | 10      |         |
| B600D-F           | 600                  | 1.2 x $R_{eH}$ (min.) |                      |         |         |

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