



Bureau of Research, Testing and Consultation (BRTC)

Department of Civil Engineering

Chittagong University of Engineering & Technology (CUET)

Chattogram-4349, Bangladesh

TEST REPORT

Memo No. : BRTC/TEST/CE/2022/047
 Supplier : Sub-Divisional Engineer, PWD Sub-Division-4, Rahmatganj, Chattogram
 Ref. No. : 25.36.1500.112.18.2021/1881
 Name of the Test : Deformed M.S. Rebar Test
 Location : Construction of Beat Office with earth work boundary wall approach road small culvert etc. at Raozan Chattogram
 Sample : Sealed

Date: 05/01/2022

Date: 27/12/2021

Nominal Dia. (mm)	Frog Mark	Actual Dia. (mm)	Av. Actual Dia. (mm)	Yield Strength (MPa), YS	Avg. Yield Strength (MPa)	Ultimate Strength (MPa), US	Avg. Ultimate Strength (MPa)	US/YS	Elongation (%)	Avg. Elongation (%)	Unit Weight (kg/m)	Avg. Unit Weight (kg/m)	Bend*	Rebend*
10	GPH B500CWR	10.00	10.00	560.5	---	649.7	---	1.16	16.26	---	0.604	0.60	S	S
		10.00		546.9		636.0		1.16	15.76		0.605			
		10.01		---		---		---	---		0.605			
12	GPH B500CWR	11.88	11.90	531.7	---	639.9	---	1.20	22.17	---	0.853	0.86	S	S
		11.90		521.4		638.3		1.22	19.21		0.855			
		11.91		---		---		---	---		0.858			
16	GPH B500CWR	16.01	15.98	546.5	---	645.9	---	1.18	23.15	---	1.564	1.56	S	S
		15.99		542.8		642.4		1.18	20.69		1.560			
		15.94		---		---		---	---		1.552			
---	0	---	---	---	---	---	---	---	---	---	---	---	---	---

Explanatory Notes: 1MPa = 145.048 psi, S=Satisfactory, U=Unsatisfactory; *: As per IS 1786-2008

ASTM A615-16 Weight requirements & nominal area of bars (Table A1.1)

Nominal Dia., mm	10	12	16	20	22	25	28	32	36	40	50	60
Nominal Area, sq. mm	79	113	201	314	380	491	616	804	1018	1257	1963	2827
Nominal Weight, kg/m	0.617	0.888	1.578	2.466	2.984	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
- Area & weight of 22 mm dia bar is derived based on principle followed for other sizes in Table A1.1
- Actual dia & US/YS ratio are provided for informative purpose only.
- These are not requirements of ASTM A615M-16

ASTM A 615M-16 Tensile Requirements for Common Steel Grades

	Grade 60 (420)	Grade 75 (520)	Grade 80 (550)
Tensile strength min. MPa (psi)	620 (90000)	690 (100000)	725 (105000)
Yield strength, min. MPa (psi)	420 (60000)	520 (75000)	550 (80000)
Elongation in 200 mm (8 in.), min %			
Bar designation No.			
10,12,16,20	9	7	7
25,22	8	7	7
28,32,36,40,50	7	6	6

Co-signed by

Head
 Department of Civil Engineering

Chittagong University of Engineering and Technology

www.civilcuat.com/h.php?p=Vm0HcwG9

Test Conducted by

Dr. Md. Abdur Rahman Bhuiyan
 Professor

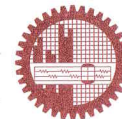
Tel: 031 714948

Cell: 01765 596552

Fax: 031 714948, 714910

E-mail: brtc_ce@cuat.ac.bd

Web: www.cuat.ac.bd



Client: Engr. Md. Delwar Hossain

Head – R&D

GPH Ispat Limited

Crown Chamber

325, Asadgonj

Chittagong 4000

Client's Reference: Nil; Date 05 December 2021

BRTC Reference: 1102-50196/MME/2021-22; Date 27 December 2021

Sample Condition: Not Sealed

Date: 06 January 2022

MME No: 0605(a)/2021-22



d00vueulfp

TEST OF DEFORMED M.S. REBAR (Test Method BDS ISO 6935-2 2016)

Frog Mark/ Identification	Sample No.	Bar Designation / 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	Rebend Test
		mm	mm	kg/m	kg/m	kN	MPa	MPa (psi)	kN	MPa	MPa (psi)		%	%	%	(Separate Sample)	(Separate Sample)
GPH B500 CWR 8	1	8	7.98	0.392	0.391	28.41	565	563 (81500)	33.94	675	678 (98500)	1.19	28	25	13	Satisfactory	Satisfactory
	2	8	7.97	0.392		28.80	573		34.72	691		1.21	28		13	Satisfactory	Satisfactory
	3	8	7.96	0.390		27.68	551		33.59	668		1.21	20		13	Satisfactory	Satisfactory

Weight Requirements and Nominal Cross-Sectional Area for Steel Rebar (As Per BDS ISO 6935-2 2016 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 ²	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 2016 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	-		14	7
B400DWR	400	1.3 × R _{EH} (min.)	1.25	17	8
B420DWR	420			16	
B500DWR	500			13	

M. HASAN

G. 1. 22

Dr. Mahbub Hasan
Professor and Head



Client: Engr. Md. Delwar Hossain
Head - R&D
GPH Ispat Limited
Crown Chamber
325, Asadgonj
Chittagong 4000

Client's Reference: Nil; Date 05 December 2021
BRTC Reference: 1102-50196/MME/2021-22; Date 27 December 2021
Sample Condition: Not Sealed

Date: 06 January 2022
MME No: 0605(b)/2021-22



d00vueulfp

TEST OF DEFORMED M.S. REBAR (Test Method BDS ISO 6935-2 2016)

Frog Mark/ Identification	Sample No.	Bar Designation / 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	Rebend Test
		mm	mm	kg/m	kg/m	kN	MPa	MPa (psi)	kN	MPa	MPa (psi)		%	%	%	(Separate Sample)	(Separate Sample)
GPH B500 CWR 10	1	10	10.03	0.620	0.619	45.57	580	578 (84000)	54.02	688	686 (99500)	1.19	22	22	13	Satisfactory	Satisfactory
	2	10	10.01	0.618		45.67	581		53.96	687		1.18	22		13	Satisfactory	Satisfactory
	3	10	10.01	0.618		44.89	572		53.63	683		1.19	22		12	Satisfactory	Satisfactory

Weight Requirements and Nominal Cross-Sectional Area for Steel Rebar (As Per BDS ISO 6935-2 2016 Table 2)

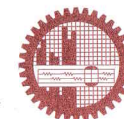
Bar Designation Number/Nominal Bar Diameter, mm	6	8	10	12	16	20	25	28	32	40
Nominal Mass per Unit Length, kg/m	0.222	0.395	0.617	0.888	1.58	2.47	3.85	4.84	6.31	9.86
Permissible Variation of Nominal Mass per Unit Length, %	±8	±8	±6	±6	±5	±5	±4	±4	±4	±4
Nominal Cross-Sectional Area, mm ²	28.3	50.3	78.5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

Minimum Tensile Requirements for Steel Rebar (As Per BDS ISO 6935-2 2016 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	-		14	7
B400DWR	400	1.3 x R _{eH} (min.)	1.25	17	8
B420DWR	420			16	
B500DWR	500			13	

M. HASAN
G. 1. 22

Dr. Mahbub Hasan
Professor and Head



Client: Engr. Md. Delwar Hossain

Head - R&D
GPH Ispat Limited
Crown Chamber
325, Asadgonj
Chittagong 4000

Client's Reference: Nil; Date 05 December 2021

BRTC Reference: 1102-50196/MME/2021-22; Date 27 December 2021

Sample Condition: Not Sealed

Date: 06 January 2022

MME No: 0605(c)/2021-22



d00vueulfp

TEST OF DEFORMED M.S. REBAR (Test Method BDS ISO 6935-2 2016)

Frog Mark/ Identification	Sample No.	Bar Designation / 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	Rebend Test
		mm	mm	kg/m	kg/m	kN	MPa	MPa (psi)	kN	MPa	MPa (psi)		%	%	%	(Separate Sample)	(Separate Sample)
GPH B500 CWR 12	1	12	11.87	0.869	0.870	65.49	579	580 (84000)	76.44	676	678 (98500)	1.17	22	19	10	Satisfactory	Satisfactory
	2	12	11.87	0.869		65.14	576		76.10	673		1.17	18		10	Satisfactory	Satisfactory
	3	12	11.89	0.872		66.32	586		77.53	686		1.17	17		11	Satisfactory	Satisfactory

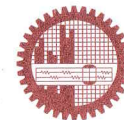
Weight Requirements and Nominal Cross-Sectional Area for Steel Rebar (As Per BDS ISO 6935-2 2016 Table 2)

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 ²	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 2016 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	-			
B400DWR	400	1.3 x R _{EH} (min.)	1.25	17	8
B420DWR	420			16	
B500DWR	500			13	

M. HASAN
6.1.22Dr. Mahbub Hasan
Professor and Head



Client: Engr. Md. Delwar Hossain

Head – R&D

GPH Ispat Limited

Crown Chamber

325, Asadgonj

Chittagong 4000

Client's Reference: Nil; Date 05 December 2021

BRTC Reference: 1102-50196/MME/2021-22; Date 27 December 2021

Sample Condition: Not Sealed

Date: 06 January 2022

MME No: 0605(d)/2021-22



d00vueulfp

TEST OF DEFORMED M.S. REBAR (Test Method BDS ISO 6935-2 2016)

Frog Mark/ Identification	Sample No.	Bar Designation / 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	Rebend Test
		mm	mm	kg/m	kg/m	kN	MPa	MPa (psi)	kN	MPa	MPa (psi)		%	%	%	(Separate Sample)	(Separate Sample)
GPH B500 CWR 16	1	16	16.09	1.596	1.597	113.75	566	568 (82500)	141.98	706	707 (102500)	1.25	20	23	11	Satisfactory	Satisfactory
	2	16	16.09	1.596		114.83	571		142.15	707		1.24	24		13	Satisfactory	Satisfactory
	3	16	16.10	1.598		114.19	568		142.29	708		1.25	25		14	Satisfactory	Satisfactory

Weight Requirements and Nominal Cross-Sectional Area for Steel Rebar (As Per BDS ISO 6935-2 2016 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 ²	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 2016 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	-			
B400DWR	400	1.3 x R _{EH} (min.)	1.25	17	8
B420DWR	420			16	
B500DWR	500			13	

M. HASAN
6.1.22Dr. Mahbub Hasan
Professor and Head



Client: Engr. Md. Delwar Hossain

Head - R&D
GPH Ispat Limited
Crown Chamber
325, Asadgonj
Chittagong 4000

Client's Reference: Nil; Date 05 December 2021

BRTC Reference: 1102-50196/MME/2021-22; Date 27 December 2021

Sample Condition: Not Sealed

Date: 06 January 2022

MME No: 0605(e)/2021-22



d00vueulfp

TEST OF DEFORMED M.S. REBAR (Test Method BDS ISO 6935-2 2016)

Frog Mark/ Identification	Sample No.	Bar Designation / 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	Rebend Test
		mm	mm	kg/m	kg/m	kN	MPa	MPa (psi)	kN	MPa	MPa (psi)		%	%	%	(Separate Sample)	(Separate Sample)
GPH B500 CWR 20	1	20	19.90	2.441	2.441	174.39	555	555 (80500)	207.58	661	661 (96000)	1.19	23	22	12	Satisfactory	Satisfactory
	2	20	19.89	2.438		173.77	553		207.20	660		1.19	19		11	Satisfactory	Satisfactory
	3	20	19.90	2.442		174.61	556		207.77	661		1.19	24		13	Satisfactory	Satisfactory

Weight Requirements and Nominal Cross-Sectional Area for Steel Rebar (As Per BDS ISO 6935-2 2016 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 ²	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 2016 Table 6)

Weight Requirements for Steel Rebar (As per ASTM A615/A615M — Table A1.1)							Ductility Properties				
Bar Designation Number/Nominal Dia., mm	R _{eh} 10	12	R _m /R _{eh} 6	20	25	A _E 28	32	36	40	50	60
	MPa			%	%	%					
Nominal Weight, kg/m	Minimum 0.61	Maximum 0.838	Minimum 1.5/8	Minimum 2.0	Minimum 3.853	Minimum 4.834	6.313	7.990	9.865	15.410	22.200

* Measured unit weight shall be less than 1.01% of the nominal weight.

B500C-R / B500CWR 500

Minimum Tensile Requirements for Steel Rebar (As Per ASTM A615/A615M - 16 Table A1.2)

Grade	Yield Strength	Tensile Strength	Grade	Yield Strength	Tensile Strength	ASTM A615 (A615M)	Bar Designation Number					
	psi (MPa)	psi (MPa)		MPa (psi)	MPa (psi)		10	12, 16	20	25	28, 32, 36	40, 50, 60
40	40,000 (280)	60,000 (420)	280	280 (40,000)	420 (60,000)	40 (280)	11	12	12	-	-	-
60	60,000 (420)	90,000 (620)	420	420 (60,000)	620 (90,000)	60 (420)	9	9	9	8	7	7
75	75,000 (520)	100,000 (690)	520	520 (75,000)	690 (100,000)	75 (520)	7	7	7	7	6	6
80	80,000 (550)	105,000 (725)	550	550 (80,000)	725 (105,000)	80 (550)	7	7	7	7	6	6
100	100,000 (690)	115,000 (790)	690	690 (100,000)	790 (115,000)	100 (690)	7	7	7	7	6	6

M. HASAN
6.1.22Dr. Mahbub Hasan
Professor and Head



Client: Engr. Md. Delwar Hossain

Head - R&D
GPH Ispat Limited
Crown Chamber
325, Asadgonj
Chittagong 4000

Client's Reference: Nil; Date 05 December 2021

BRTC Reference: 1102-50196/MME/2021-22; Date 27 December 2021

Sample Condition: Not Sealed

Date: 06 January 2022

MME No: 0605(g)/2021-22



d00vueulfp

TEST OF DEFORMED M.S. REBAR (Test Method BDS ISO 6935-2 2016)

Frog Mark/ Identification	Sample No.	Bar Designation / 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	Rebend Test
		mm	mm	kg/m	kg/m	kN	MPa	MPa (psi)	kN	MPa	MPa (psi)		%	%	%	(Separate Sample)	(Separate Sample)
GPH B500 CWR 25	1	25	24.99	3.850	3.841	271.94	554	549 (79500)	336.24	685	684 (99000)	1.24	22	20	12	Satisfactory	Satisfactory
	2	25	24.94	3.834		268.94	548		336.06	685		1.25	17		12	Satisfactory	Satisfactory
	3	25	24.95	3.839		268.00	546		334.77	682		1.25	20		13	Satisfactory	Satisfactory

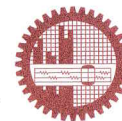
Weight Requirements and Nominal Cross-Sectional Area for Steel Rebar (As Per BDS ISO 6935-2 2016 Table 2)

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 ²	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 2016 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	-		17	8
B400DWR	400	1.3 x R _{eh} (min.)	1.25	16	
B420DWR	420			13	
B500DWR	500				

M. HASAN
6.1.22Dr. Mahbub Hasan
Professor and Head



Client: Engr. Md. Delwar Hossain

Head - R&D
GPH Ispat Limited
Crown Chamber
325, Asadgonj
Chittagong 4000

Client's Reference: Nil; Date 05 December 2021

BRTC Reference: 1102-50196/MME/2021-22; Date 27 December 2021

Sample Condition: Not Sealed

Date: 06 January 2022

MME No: 0605(i)/2021-22



d00vueulfp

TEST OF DEFORMED M.S. REBAR (Test Method BDS ISO 6935-2 2016)

Frog Mark/ Identification	Sample No.	Bar Designation / 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	Rebend Test
		mm	mm	kg/m	kg/m	kN	MPa	MPa (psi)	kN	MPa	MPa (psi)		%	%	%	(Separate Sample)	(Separate Sample)
GPH B500 CWR 32	1	32	31.85	6.255	6.257	475.57	591	589 (85500)	561.04	698	696 (101000)	1.18	14	17	12	Satisfactory	Satisfactory
	2	32	31.87	6.263		474.37	590		559.78	696		1.18	18		13	Satisfactory	Satisfactory
	3	32	31.84	6.252		472.08	587		559.00	695		1.18	19		13	Satisfactory	Satisfactory

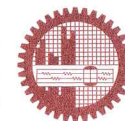
Weight Requirements and Nominal Cross-Sectional Area for Steel Rebar (As Per BDS ISO 6935-2 2016 Table 2)

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 ²	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 2016 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	-		17	8
B400DWR	400	1.3 x R _{EH} (min.)	1.25	16	
B420DWR	420			13	
B500DWR	500				

M. HAJAN
G. 1.22Dr. Mahbub Hasan
Professor and Head



Client: Engr. Md. Delwar Hossain

Head - R&D
GPH Ispat Limited
Crown Chamber
325, Asadgonj
Chittagong 4000

Client's Reference: Nil; Date 05 December 2021

BRTC Reference: 1102-50196/MME/2021-22; Date 27 December 2021

Sample Condition: Not Sealed

Date: 06 January 2022

MME No: 0605(j)/2021-22



d00vueulfp

TEST OF DEFORMED M.S. REBAR (Test Method BDS ISO 6935-2 2016)

Frog Mark/ Identification	Sample No.	Bar Designation / 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	Rebend Test
		mm	mm	kg/m	kg/m	kN	MPa	MPa (psi)	kN	MPa	MPa (psi)		%	%	%	(Separate Sample)	(Separate Sample)
GPH B500 CWR 40	1	40	39.71	9.723	9.728	737.20	587	583 (84500)	890.60	709	705 (102500)	1.21	19	19	14	Satisfactory	Satisfactory
	2	40	39.75	9.741		727.30	579		882.12	702		1.21	19		14	Satisfactory	Satisfactory
	3	40	39.70	9.719		733.00	583		883.18	703		1.21	18		15	Satisfactory	Satisfactory

Weight Requirements and Nominal Cross-Sectional Area for Steel Rebar (As Per BDS ISO 6935-2 2016 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 ²	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 2016 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	-		14	7
B400DWR	400	1.3 x R _{EH} (min.)	1.25	17	8
B420DWR	420			16	
B500DWR	500			13	

M. HASAN
6.1.22Dr. Mahbub Hasan
Professor and Head