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 — Date: 05/01/2022

Ref. No. : 25.36.1500.112.18.2021/1881

Name of the Test : **Deformed M.S. Rebar Test** — Date: 27/12/2021

Location : Construction of Beat Office with earth work boundary wall approach road small culvert etc.at Raozan Chattogram

Sample : Sealed

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

Countersigned by

Head
Department of Civil Engineering
Chittagong University of Engineering and Technology

17/01/2022

Test Conducted by

Dr. Md. Abdur Rahman Bhuiyan
Professor

17/1/22

Tel: 031 714948 Cell: 01765 596552 Fax: 031 714948, 714910 E-mail: brtc_ce@cuet.ac.bd Web: www.cuet.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**

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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 Facture, A	Elongation at Maximum Force, A_{gt}	Bend Test (Separate Sample)	Rebend Test (Separate Sample)
		mm	mm	kg/m	kg/m	kN	MPa	MPa (psi)	kN	MPa	MPa (psi)		%	%	%		
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 R_{eH} MPa		R_m/R_{eH}	Ductility Properties A %	A_{gt} %
	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	

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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**

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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 Facture, A	Elongation at Maximum Force, A_{gt}	Bend Test (Separate Sample)	Rebend Test (Separate Sample)
		mm	mm	kg/m	kg/m	kN	MPa	MPa (psi)	kN	MPa	MPa (psi)		%	%	%		
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	-			
B400DWR	400	1.3 x R_{eH} (min.)	1.25	17	8
B420DWR	420			16	
B500DWR	500			13	

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Client: Engr. Md. Delwar Hossain
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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**

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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 Facture, A	Elongation at Maximum Force, A_{gt}	Bend Test (Separate Sample)	Rebend Test (Separate Sample)
		mm	mm	kg/m	kg/m	kN	MPa	MPa (psi)	kN	MPa	MPa (psi)		%	%	%		
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 R_{eH} MPa		Ductility Properties R_m/R_{eH}	A %	A_{gt} %
	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	

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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**

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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 Facture, A	Elongation at Maximum Force, A_{gt}	Bend Test (Separate Sample)	Rebend Test (Separate Sample)
		mm	mm	kg/m	kg/m	kN	MPa	MPa (psi)	kN	MPa	MPa (psi)		%	%	%		
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 R_{eH} MPa		Ductility Properties R_m/R_{eH}	A %	A_{gt} %
	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	

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Client:	Engr. Md. Delwar Hossain	Client's Reference:	Nil; Date 05 December 2021	Date:	06 January 2022
	Head – R&D	BRTC Reference:	1102-50196/MME/2021-22; Date 27 December 2021	MME No:	**0605(e)/2021-22**
	GPH Ispat Limited	Sample Condition:	Not Sealed		
	Crown Chamber				
	325, Asadgonj				
	Chittagong 4000				

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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 Facture, A	Elongation at Maximum Force, A_{gt}	Bend Test (Separate Sample)	Rebend Test (Separate Sample)
		mm	mm	kg/m	kg/m	kN	MPa	MPa (psi)	kN	MPa	MPa (psi)		%	%	%		
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)

Steel Grade	Upper Yield Strength R_{eH} MPa Minimum	Upper Yield Strength R_{eH} MPa Maximum	Ductility Properties R_m/ R_{eH} Minimum	A % Minimum	A_{gt} % 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	

Weight Requirements for Steel Rebar (As Per ASTM A615/A615M—16 Table A1.1)

Bar Designation Number/Nominal Dia., mm	10	12	16	20	25	28	32	36	40	50	60
Nominal Weight, kg/m	0.617	0.888	1.578	2.466	3.853	4.834	6.313	7.990	9.865	15.410	22.200

* Measured unit weight shall not be less than 94% of the nominal weight.

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

ASTM A615 Grade	Yield Strength psi (MPa)	Tensile Strength psi (MPa)	ASTM A615M Grade	Yield Strength MPa (psi)	Tensile Strength MPa (psi)	Grade ASTM A615 (A615M)	10	12, 16	20	25	28, 32, 36	40, 50, 60
							Minimum Elongation in 8 in. (200 mm) Gauge Length, per cent — Bar Designation Number					
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

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Please note: *The client supplied the sample(s) and the result given herewith corresponds to the sample(s) tested only. Department of MME, BUET takes no responsibility regarding the misidentification, if any, of the sample(s).*

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**

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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 Facture, A	Elongation at Maximum Force, A_{gt}	Bend Test (Separate Sample)	Rebend Test (Separate Sample)
		mm	mm	kg/m	kg/m	kN	MPa	MPa (psi)	kN	MPa	MPa (psi)		%	%	%		
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 R_{eH} MPa		R_m/R_{eH}	Ductility Properties A %	A_{gt} %
	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	

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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**

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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 Facture, A	Elongation at Maximum Force, A_{gt}	Bend Test (Separate Sample)	Rebend Test (Separate Sample)
		mm	mm	kg/m	kg/m	kN	MPa	MPa (psi)	kN	MPa	MPa (psi)		%	%	%		
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 R_{eH} MPa		Ductility Properties R_m/R_{eH}	A %	A_{gt} %
	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	

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Professor and Head

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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 Facture, A	Elongation at Maximum Force, A_{gt}	Bend Test (Separate Sample)	Rebend Test (Separate Sample)
		mm	mm	kg/m	kg/m	kN	MPa	MPa (psi)	kN	MPa	MPa (psi)		%	%	%		
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 R_{eH} MPa		R_m/R_{eH}	Ductility Properties A %	A_{gt} %
	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	

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