

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

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

### STRENGTH OF MATERIALS LABORATORY

Sent by: Eng. Md. Maksudul Karim, General Manager (Plant)

Shahriar Steel Mills Limited, Konapara, Jatrabari, Dhaka.

TEST OF DEFORMED M.S. BARS IBDS ISO 6935-2:20161

BRTC No.: 1102-94137/CE/22-23; Dt. 18/6/2023

Date of Test: 21/6/2023 Ref.: Letter; Dt. 11/6/2023

Contractor/supplier: ---

Samples were received in HNSFALFD condition

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Nominal bar dia., mm	DS ISO 693:	•			•			-						3	2	-				N <sub>O</sub>	SI.	
dia., mm 6 8	BDS ISO 6935-2:2016 Weight Requirements, Nominal Area etc. (Table 2).	•	1	1	1	1			-	-	·	1	I	SSRM B420 DWR	SSRM B420 DWR	SSRM B420 DWR				Identification	Frog Mark /	
10 12 14	. (Table 2).		1	•					•				•	10	10	10	mm			dia.	Nominal	
16 20		-		-	-	1			-					9.9	9.9	9.9	mm			dia.	Actual	
22*		-	-	-		-					- //	•	-	0.598	0.599	0.598	kg/m	Length	Unit	Per	Mass	
25 28 32 40															0.598		kg/m	Length	Unit	Mass Per	Average	
50							_			Kalled State	WARAETT.			33.1	34.1	34.1	ΚN		Load	Proof	Yield or	
COLIVEIS	Convore	•	•									). ///	•	419	431	431	MPa	R <sub>±</sub>	Strength	Proof	Yield or	
TOTAL TACKUT. 1.0	ion factor 10					•			S- 10 2000 000000000000000000000000000000						427		MPa	Ref	Strength,	Yield	Average	
ALL OLIVE	MD5 - 10					-								47.3	47.3	47.3	××			Load	Tensile	
145 - 145	N/mm <sup>2</sup> - 145												-	600	600	600	MΡa	Zo ₃		Strength	Tensile	Samples .
pai. oueligu	nei Strongt								•			•			600		MPa	⊒	Strength,	Tensile	Average	7.7.777.
is alle pase	he are bace								•			•			1.41						R <sub>m</sub> /R <sub>eH</sub>	CH 111 C.11
Conversion (acco): 1.0 Mir a = 1.0 Minin = 140 psi. Otteriguis are pased of frontial area.	d on pominal											•	-	28	30	28	= 5d)	(G.length	(%)	Elongation	Total	eampied were reserved in emergence somainsm.
ai da.	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2					•									29			(%)	Elongation	Total	Average	
			•		•	•	•	•	•	•			•	Satisfactory	Satisfactory	Satisfactory		samples)	(Seperate	Test	Bend	
							,			•	•			•	•					Tes	Rebe	

22mm dia. bar is not covered in BDS ISO 6935-2:2016. Its properties are derived following the principle used for other bar sizes

lominal mass per |Nominal, kg/m

minal cross sectional area, sq.mm

Steel	Yield S	Steel Yield Strength, Ret, MPa Ductiliy Properti	Du	Ductiliy Properties	ties
Grade	Min.	Max.	Rm/ReH	Elongation	n, % (min.)
			min.	Total	At R
B400C-R	400		1.15	7.1	7
B400CWR	400		1.15	FF	
B500C-R	500		1.15	71	7
B500CWR	500		1.15	14	7
B600C-R	600		1.15	0,	
B450CWR	450	1.25 R eн (min.)	1.15		7.5
B400DWR	400	1.3 R eн (min.)	1.25	40	8
B420DWR	420	1.3 R <sub>eH</sub> (min.)	1.25	91	8
B500DWR	500	1.3 R .H (min.)	125	EF	9

Countersigned by:

Prof. Dr. Hasib Mohammed Ahsan, Test-in-Charge

Dept. of Civil Engg., BUET, Dhaka-1000, Bangladesh

LRGBWZK4b

25 June 2023

Dr. Md. Ferdous Alam Test performed by:

Assistant Professor, Dept. of Civil Engg., Bl

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



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#### STRENGTH OF MATERIALS LABORATORY

TEST OF DEFORMED M.S. BARS IBDS ISO 6935-2:2016

Project: Sent by: Eng. Md. Maksudul Karim, General Manager (Plant) Shahriar Steel Mills Limited, Konapara, Jatrabari, Dhaka.

> Ref.: Letter; Dt. 11/6/2023 BRTC No.: 1102-94137/CE/22-23; Dt. 18/6/2023

Contractor/supplier: --Date of Test: 21/6/2023

Samples were received in UNSEALED condition.

•		-	,		•	•		,				ယ	2	1				No.	SI.
-	-	_	•	•	-	-	-		-	ı	1	SSRM B420 DWR	SSRM B420 DWR	SSRM B420 DWR				Identification	Frog Mark /
-	-							•				12	12	12	mm			dia.	Nominal
-	-		-		•	-	-		-		1	11.9	11.8	11.8	mm			dia.	Actual
_	-				7.4	\ <u></u>			-	_	-	0.875	0.860	0.853	kg/m	Length	Unit	Per	Mass
						**!	- Contraction (contraction)	III jednodradow					0.863		kg/m	Length	Unit	Mass Per	Average
				,	•				al alternation	100		52.4	51.4	52.4	kN		Load	Proof	Yield or
		•								). )	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	405	454	463	MPa	R 완	Strength	Proof	Yield or
	3.												460		MPa	ス 発	Strength,	Yield	Average
	-	-		-	+							74.7		71.7	Š			Load	Tensile
	-	•		,	(8)		•	-			•	000	633	635	MPa	<i>7</i> 0 ₃		Strength	Tensile
	•												<b>04</b> 3	i i	MPa	<b>7</b> 0	Strength,	Tensile	Average
													1.40	`					R <sub>m</sub> /R <sub>eH</sub>
	-	•						1	•	•	•	23	23 0	25	= 5d)	(G.length	(%)	Elongation	Total
							•						4	2		(%)	Elongation	Total	Average
•	1		-									valisiaciony	Satisfactory	Satisfactory		samples)	(Seperate	Test	Bend
			-															lest	Reben

BDS ISO 6935-2:2016 Weight Requirements, Nominal Area etc. (Table 2).

Nominal bar dia., mm | 6 | 8 | 10 | 12 Actual diameter of bars are shown for informative purpose only. It is not a requirement of BDS ISO 6935-2:2016. lominal mass per Nominal, kg/m 22mm dia. bar is not covered in BDS ISO 6935-2:2016. Its properties are derived following the principle used for other bar sizes minal cross sectional area, sq.mm

Conversion factor: 1.0 MPa = 1.0 N/mm<sup>2</sup> = 145 psi. Strengths are based on nominal area

Steel	Yield S	Steel Yield Strength, R at, MPa Ductilly Properti	Du	<b>Ductilly Properties</b>	ties
Grade	Min.	Max.	Rm/ReH	Elongation	n, % (min.)
			min.	Total	At R <sub>m</sub>
B400C-R	400	•	1.15	14	7
B400CWR	400		1.15	74	7
B500C-R	500	*	1.15	14	7
B500CWR	500		1.15	14	7
B600C-R	600		1.15	10	7
B450CWR	450	1.25 R et (min.)	1.15		7.5
B400DWR	400	1.3 Ret (min.)	1.25	17	8
B420DWR	420	1.3 R eH (min.)	1.25	16	8
RSOODWR	500	1.3 R .H (min.)	1 25	3	8

Countersigned by:

Dept. of Civil Engg., BUET, Dhaka-1000, Bangladesh Prof. Dr. Hasib Mohammed Ahsan, Test-in-Charge

It is also recommended that the test results be collected by a duly authorized person.

[5G7tfC6]



Dr. Md. Ferdous Alam Test performed by:

Assistant Professor, Dept. of Civil Engg., Bl

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Testing & Consulta Bureau of Resea

#### STRENGTH OF MATERIALS LABORATORY

TEST OF DEFORMED M.S. BARS [BDS ISO 6935-2:2016]

Sent by: Eng. Md. Maksudul Karim, General Manager (Plant) Shahriar Steel Mills Limited, Konapara, Jatrabari, Dhaka.

Project:

BRTC No.: 1102-94137/CE/22-23; Dt. 18/6/2023

Date of Test: 21/6/2023 Ref.: Letter; Dt. 11/6/2023

Contractor/supplier: ---

Samples were received in UNSEALED condition

	-	-	-		-		•	•	-	•	•	3	2	1				₹.	SI.	
1	1	-	7	<b>.</b>	1	1	-	-		1		SSRM B420 DWR	SSRM B420 DWR	SSRM B420 DWR				Identification	Frog Mark /	
	•	1	•	•	•	•	•		•	•		16	16	16	mm			dia.	Nominal	
-	1	-	•					-	-	-	-	15.8	15.9	15.9	mm			dia.	Actual	
	1	1		7		1.5	77		-	4	-	1.533	1.563	1.558	kg/m	Length	Unit	Per	Mass	
				<b>1</b>									1.551		kg/m		1111	Mass Per	Average	
					-	HILL						81	82.9	82.9	ΚN		Load	Proof	Yield or	
	•		•						) () () ()			403	413	413	MPa	Ref	Strength	Proof	Yield or	
													409		MPa	70 gr	Strength,	Yield	Average	
			-	T	_	•						123	125	126	Š			Load	Tensile	
	•	-	-	-	1000	•			-		•	610	620	625	MPa	Zo ₃		Strength	Tensile	
							•			•			620		MPa	æ	Strength,	Tensile	Average	
	•			•									1.52						R <sub>m</sub> /R <sub>eH</sub>	
					•			•	•	•	•	24	24	23	= 5d)	(G.length	(%)	Elongation	Total	Campios solo localida in cita - I commission
	•						•			•			24			(%)	Elongation	Total	Average	
,			•		•		•	•			•	Satisfactory	Satisfactory	Satisfactory		samples)	(Seperate	Test	Bend	
									-									Te	Rebe	

Nominal bar dia., mm Nominal mass per Nominal, kg/m BDS ISO 6935-2:2016 Weight Requirements, Nominal Area etc. (Table 2). iinal cross sectional area, sq.mm

Actual diameter of bars are shown for informative purpose only. It is not a requirement 2mm dia. bar is not covered in BDS ISO 6935-2:2016. Its properties are derived following the principle used for other bar sizes

BDS ISO 6935-2 Tensile Requirements for Common Steel Grades

Steel	A PIPIA	Steel Vield Strength P MPa Ductility Properti		Ductiliv Properties
Grade	Min.	Max.	Rm/ReH	Elongation
			min.	Total
B400C-R	400		1.15	74
B400CWR	400		1.15	14
B500C-R	005		1.15	14
B500CWR	005		1.15	14
B600C-R	009		1.15	10
B450CWR	450	1.25 R <sub>ен</sub> (min.)	1.15	
B400DWR	400	1.3 R <sub>ен</sub> (min.)	1.25	17
B420DWR	420	1.3 R <sub>eн</sub> (min.)	1.25	16
BENNOWB	200	13 Bas (min )	105	

Countersigned by:

Dept. of Civil Engg., BUET, Dhaka-1000, Bangladesh Prof. Dr. Hasib Mohammed Ahsan, Test-in-Charge



Conversion factor: 1.0 MPa = 1.0 N/mm<sup>2</sup> = 145 psi. Strengths are based on nominal area

Dr. Md. Ferdous Alam

Assistant Professor, Dept. of Civil Engg., B

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BRTC No.: 1102-94137/CE/22-23; Dt. 18/6/2023

Date of Test: 21/6/2023 Ref.: Letter; Dt. 11/6/2023 Contractor/supplier: ---

SI.
Frog Mark
Nominal Actual Mass Average   Yield or Yield or Average   Iensile   Average   Km/K en
minal         Actual         Mass         Average         Yield or         Average         Frest or         Frest or         Frest or         Average         Frest or         <
minal         Actual         Mass         Average         Yield or         Average         Frest or         Frest or         Frest or         Average         Frest or         <
Mass         Average         Yield or         Average         Fersile         Lensile         Average         Fersile         Average         Fersile         Average         Fersile         Average         Fersile         Average         Fersile         Fersile         Fersile         Fersile         Fersile         Tensile         Tensile         Strength         Fersile         Fersile <th< td=""></th<>
Average         Yield or         Average         I ensile         Lensile         Average         Remit ensile         Average         Remit ensile         Average         Remit ensile         Average         Remit ensile         Remit ensile         Tensile         Tensile         Tensile         Strength         Strength         Strength         Strength         Strength         Strength         Remit ensile         Remit
Yield or Yield or Proof         Average Proof         Iensile Proof         Average Proof         Final Proof         Average Proof         Final Proof         Average Proof         Av
Yield or Average Proof         Average Proof         Iensile Strength         Average Frail         Average Proof
Average lensile lensile Average K <sub>m</sub> /K <sub>eH</sub> Yield Load Strength Tensile  Strength, R <sub>m</sub> MPa kN MPa Strength  469 204 650  201 640
Load   Strength   Tensile   Km/KeH
nsile lensile Average $\kappa_{m}/\kappa_{eH}$ coad Strength Tensile Strength. $R_{m}$
Average K <sub>m</sub> /K <sub>e</sub> H Tensile Strength, R <sub>m</sub> MPa  645 1.38
Average $K_{m}/K_{eH}$ Tensile Strength, $R_{m}$ MPa  1.38  645  1.38
Elongat Elongat (G.) (G.) (G.) (Elongat (G.) (G.) (G.) (G.) (G.) (G.) (G.) (G.)
Average Total Elongation (%) 26
Test (Seperate samples)  Satisfactory Satisfactory Satisfactory

*22	u.	No	No	Nor	BD
nm dia	unit length	ninal n	ninal c	ninal b	SISO 6
bar is		mass per	ross se	bar dia., ı	BDS ISO 6935-2:2016
*22mm dia. bar is not covered in BDS ISO 6935-2:2016. Its properties are derived following	Permissible deviation,	r Nominal, kg/m	Nominal cross sectional area, sq.mm	ww	016 Weight Requirements, Nominal
6935-2:2	ı,% ±8	0.222	28.3	6	s, Nomi
016. Its	3   ±8	22 0.39	.3 50.3	8	nal Area
proper	±6	5 0.616	3 78.5	10	Area etc. (Table
ties are	±6	0.887	113	12	able 2).
derive	±6 ±5 ±5	1.21		14	
d follo	±5	1.58	154 201 314 380 4	6	
wingt	±5   ±5   ±4   ±4   ±4	2.46	314	20	
the pri	±5	2.98 3.85	380	22*	
nciple	#	3.85	9	25	
used	艾	4.84	616	28	
for oth	Ħ	6.31	6 804 12	32	
ner ba	拉	9.87	1257	8	
inciple used for other bar sizes.	Ħ	15.42	1964	50	

Conversion factor: 1.0 MPa = 1.0 N/mm<sup>2</sup> = 145 psi. Strengths are based on nominal area

Actual diameter of bars are shown for informative purpose only. It is not a requirement of BDS ISO 6835-2:2016. Actual diameter is the diameter of a perfectly round plain bar having same mass per unit length.

Steel	Yield S	Steel Yield Strength, Ret, MPa Ductiliy Properti	Du	<b>Ductilly Properties</b>	rties
Grade	Min.	Max.	Rm/ReH	Elongation	n, % (min.)
			min.	Total	1//
B400C-R	400	-	1.15	74	7
B400CWR	400	-	1.15	14	7
B500C-R	005		1.15	7.0	
B500CWR	500		1.15	14	7
B600C-R	600		1.15	10	7
B450CWR	450	1.25 R <sub>eH</sub> (min.)	1.15		7.5
B400DWR	400	1.3 R eн (min.)	1.25	17	8
B420DWR	420	1.3 R eн (min.)	1.25	16	8
B500DWR	500	1.3 R ↔ (min.)	1.25	3	8

Countersigned by:

Dept. of Civil Engg., BUET, Dhaka-1000, Bangladesh Prof. Dr. Hasib Mohammed Ahsan, Test-in-Charge

It is also recommended that the test results be collected by a duly authorized person.

nrM9LfbHt

25 June 2023

Dr. Md. Ferdous Alam Test performed by:

Assistant Professor, Dept. of Civil Engg.,

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Sent by: Eng. Md. Maksudul Karim, General Manager (Plant)
Shahriar Steel Mills Limited, Konapara, Jatrabari, Dhaka.

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Contractor/supplier: --

Ref.: Letter; Dt. 11/6/2023

Date of Test: 21/6/2023

Samples were received in UNSEALED condition.

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-	•	•										-	-			-
	,					040	310		461	226		3.804	24.8	25	SSRM B420 DWR	ယ
	Satisfactory		2			0 0	3 6	400	400	222	3.601	3.809	24.9	25	SSRM B420 DWR	N
	Satisfactory	24	23	1 40	645	640	2) C	) 100	460	027		3.807	24.8	25	SSRM B420 DWR	1
	Satisfactory		24			645	216		104		1	, in Bir		I.I.I.I		
-			= 5d)		MPa	MPa	X	MPa	MPa	ΚΝ	ko/m	kolm	3	3		
	samples)	(%)	(G.Jength		⊃0 3	R <sub>m</sub>		Res	ReH		Length	Length				
	(Seperate	Elongation	(%)		Strength,			Strength,	Strength	Load	Unit	Unit				
-	) lest	lotal	Elongation		Tensile	Strength	Load	Yield	Proof	Proof	Mass Per	Per	dia.	dia	dentification	5 9
/	<b>,</b> ,	7,090	Q	m// eH	Avelage	Hensile	lensile	Average	Yield or	Yield or	Average	Mass	Actual	Nominal	Frog Mark /	Ω

*22mm dia har is not covered in BDS ISO 6935-2:2016. Its properties are derived following the principle used for other bar sizes.	unit length Permissible	Nominal mass per  Nominal, kg/m	Nominal cross sectional area, sq.mm	C	Nominal hardia. mm	BDS ISO 6935-2:2016 Weight Requirements, Nominal Area etc. (Table 2).	
8509 USI 300	Permissible deviation, %   ±8   ±6	<u>/</u> m	q.mm			quirements, No	
2001	±8	0.222	28.3		6	minal	
9	8∓	0.395	50.3		<b>&amp;</b>	Area	
ropert	±6	0.616	78.5		10	etc. (Ta	
00 200	±6   ±5   ±5   ±5   ±4   ±4   ±4   ±4   ±4	0.222   0.395   0.616   0.887   1.21   1.58   2.46   2.98   3.85   4.84   6.31   9.87	50.3 78.5 113 154 201 314 300 451 616 604 1237		12	ble 2).	
derive	±5	1.21	154		14		
5	±5	1.58	107		16		
wing	±5	2.46	314	2	20		
theor	±5	2.98	300	2000	20 22 25		
ncip	##	3.85	191	2	25		
e usec	##	4.84	0	646	20		
for o	11.	0.31	004	004	20	3	
ther ba	114	9.07	16.07	4367	40		
ar sizes	14	15.42	1004	600	00		

Actual diameter of bars are shown for informative purpose only. It is not a requirement of BDS ISO 6835-2:2016. Actual diameter is the diameter of a perfectly round plain bar having same mass per unit length.

Steel	Yield S	Steel Yield Strength, R. H. MPa Ductiliy Properti	Du	<b>Ductiliy Properties</b>	ties
Grade	Min	Max.	Rm/Res	Elongation.	n, % (min.)
			min.	Total	At R <sub>m</sub>
B400C-R	400	-	1.15	14	7
B400CWR	400	-	1.15	14	7
B500C-R	500	•	1.15	14	7
B500CWR	500		1.15	14	7
B600C-R	600	-	1.15	10	7
B450CWR	450	1.25 R eн (min.)	1.15		7.5
B400DWR	400	1.3 R <sub>eH</sub> (min.)	1.25	17	8
B420DWR	420	1.3 R eH (min.)	1.25	16	8
B500DWR	500	1.3 R eн (min.)	1.25	3	8

Countersigned by:

Dept. of Civil Engg., BUET, Dhaka-1000, Bangladesh Prof. Dr. Hasib Mohammed Ahsan, Test-in-Charge

rAEKtZdZE



25 June 2023

Test performed by: Dr. Md. Ferdous Alam

Assistant Professor, Dept. of Civil Engg., B

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