

BUET TEST REPORT

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY (BUET)
DEPARTMENT OF CIVIL ENGINEERING
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STRENGTH OF MATERIALS LABORATORY

TEST OF DEFORMED M.S. BARS [ASTM A 706]
 Sent by: Mr. Kazi Ameer Ahmed, General Manager (Corporate Affairs), Dhaka Corporate Office, BSRM Steels Limited.
 Project: -

BRTC No.: 1101-75437/CE/18-19; Date: 11/12/2018
 Reference: Letter, Date: 11/12/2018
 Date of Test: 11/2019
 Contractor/Supplier:
 Samples were received in unsealed condition.

Serial No.	Frog Mark / Identification	Bar Designation	Nominal diameter (mm)	Actual bar diameter (mm)	Unit Weight (kg/m)	Average Unit Weight (kg/m)	Yield or Proof Load (kN)	Yield or Proof Strength (MPa)	Average Yield or Proof Strength (YS) (MPa)	Tensile Load (kN)	Tensile Strength (TS) (MPa)	Average Tensile Strength (TS) (MPa)	TS/YS	Elongation (%) (Gauge Length = 200 mm)	Average Elongation (%)	Bond Test
1	BSRM ULTIMA 4200	20	19.9	2.441	2.443	149	475	480	212	675	680	1.42	28	28	Satisfactory	
2	BSRM ULTIMA 4200	20	19.9	2.441	2.443	148	472	480	211	670	680	1.42	29	28	Satisfactory	
3	BSRM ULTIMA 4200	20	19.9	2.448	2.443	155	495	480	218	695	680	1.42	28	28	Satisfactory	
1	BSRM ULTIMA 4200	16	16.0	1.576	1.573	92.1	458	462	136	575	580	1.47	24	24	Satisfactory	
2	BSRM ULTIMA 4200	16	16.0	1.570	1.573	93.1	463	462	137	580	580	1.47	24	24	Satisfactory	
3	BSRM ULTIMA 4200	16	16.0	1.573	1.573	93.1	463	462	137	580	580	1.47	24	24	Satisfactory	
1	BSRM ULTIMA 4200	12	12.0	0.887	0.887	52.9	468	477	77.3	685	690	1.45	20	20	Satisfactory	
2	BSRM ULTIMA 4200	12	12.0	0.887	0.887	54.6	484	480	78.2	690	690	1.45	21	21	Satisfactory	
3	BSRM ULTIMA 4200	12	12.0	0.887	0.887	54.2	480	480	78.2	690	690	1.45	21	21	Satisfactory	
1	BSRM ULTIMA 4200	10	9.9	0.606	0.606	37.8	478	478	53.8	680	685	1.43	20	20	Satisfactory	
2	BSRM ULTIMA 4200	10	9.9	0.606	0.606	38.2	484	478	54.2	685	685	1.43	21	20	Satisfactory	
3	BSRM ULTIMA 4200	10	9.9	0.607	0.607	37.3	472	472	54.2	685	685	1.43	20	20	Satisfactory	
1	BSRM ULTIMA 4200	8	8.0	0.594	0.594	24	477	474	34.7	690	695	1.47	14	14	Satisfactory	
2	BSRM ULTIMA 4200	8	8.0	0.594	0.594	24	477	474	34.7	690	695	1.47	15	15	Satisfactory	
3	BSRM ULTIMA 4200	8	8.0	0.596	0.596	23.5	466	466	35.1	700	700	1.47	15	15	Satisfactory	
1	BSRM ULTIMA 4200	40	39.3	9.525	9.544	597	475	471	825	655	655	1.39	23	23	Satisfactory	
2	BSRM ULTIMA 4200	40	39.3	9.531	9.544	595	473	471	822	655	655	1.39	23	24	Satisfactory	
3	BSRM ULTIMA 4200	40	39.4	9.577	9.544	584	465	471	815	650	650	1.39	25	25	Satisfactory	
1	BSRM ULTIMA 4200	32	31.8	6.216	6.201	388	482	475	571	710	700	1.47	23	23	Satisfactory	
2	BSRM ULTIMA 4200	32	31.7	6.183	6.201	379	471	471	560	695	695	1.47	23	23	Satisfactory	
3	BSRM ULTIMA 4200	32	31.7	6.205	6.201	380	473	473	563	700	700	1.47	24	24	Satisfactory	
1	BSRM ULTIMA 4200	28	28.1	4.857	4.845	293	476	481	421	685	690	1.43	21	21	Satisfactory	
2	BSRM ULTIMA 4200	28	28.0	4.840	4.845	299	485	485	427	695	695	1.43	23	22	Satisfactory	
3	BSRM ULTIMA 4200	28	28.0	4.838	4.845	296	481	481	425	690	690	1.43	22	22	Satisfactory	
1	BSRM ULTIMA 4200	25	25.1	3.879	3.869	235	479	480	336	685	685	1.43	23	23	Satisfactory	
2	BSRM ULTIMA 4200	25	25.0	3.858	3.869	234	477	480	335	680	680	1.43	24	23	Satisfactory	
3	BSRM ULTIMA 4200	25	25.0	3.899	3.869	238	485	485	337	685	685	1.43	23	23	Satisfactory	
1	BSRM ULTIMA 4200	22	22.0	2.977	2.974	192	505	494	287	700	695	1.41	21	21	Satisfactory	
2	BSRM ULTIMA 4200	22	21.9	2.970	2.974	185	487	487	281	685	685	1.41	22	22	Satisfactory	
3	BSRM ULTIMA 4200	22	22.0	2.975	2.974	180	489	489	282	690	690	1.41	23	23	Satisfactory	

Conversion factor: 1.0 MPa = 14.30 psi

TABLE 1: Deformed Bar Designation Numbers, Nominal Weight (kg/m), Nominal Dimensions, and Dimensions

TABLE 2: Tensile Requirements

Authenticity of this page is verifiable from <http://verify.ce.bsrltd.com> with the QR Code of ID: NICK8F3X9

Test performed by: Mr. Ruhul Amin, Assistant Professor, Dept. of Civil Engg.

Important Note: Samples as supplied to us have been tested. BRTC does not have any responsibility as to the representative character of samples as sent in a secure and sealed cover/box/container under the signature of a competent authority. In order to avoid fraudulent use, it is also recommended that the test results be collected by a duly authorized person.

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EARTHQUAKES DON'T KILL PEOPLE. BUILDINGS DO.

– Susan Hough and Lucile Jones, U.S. Geological Survey

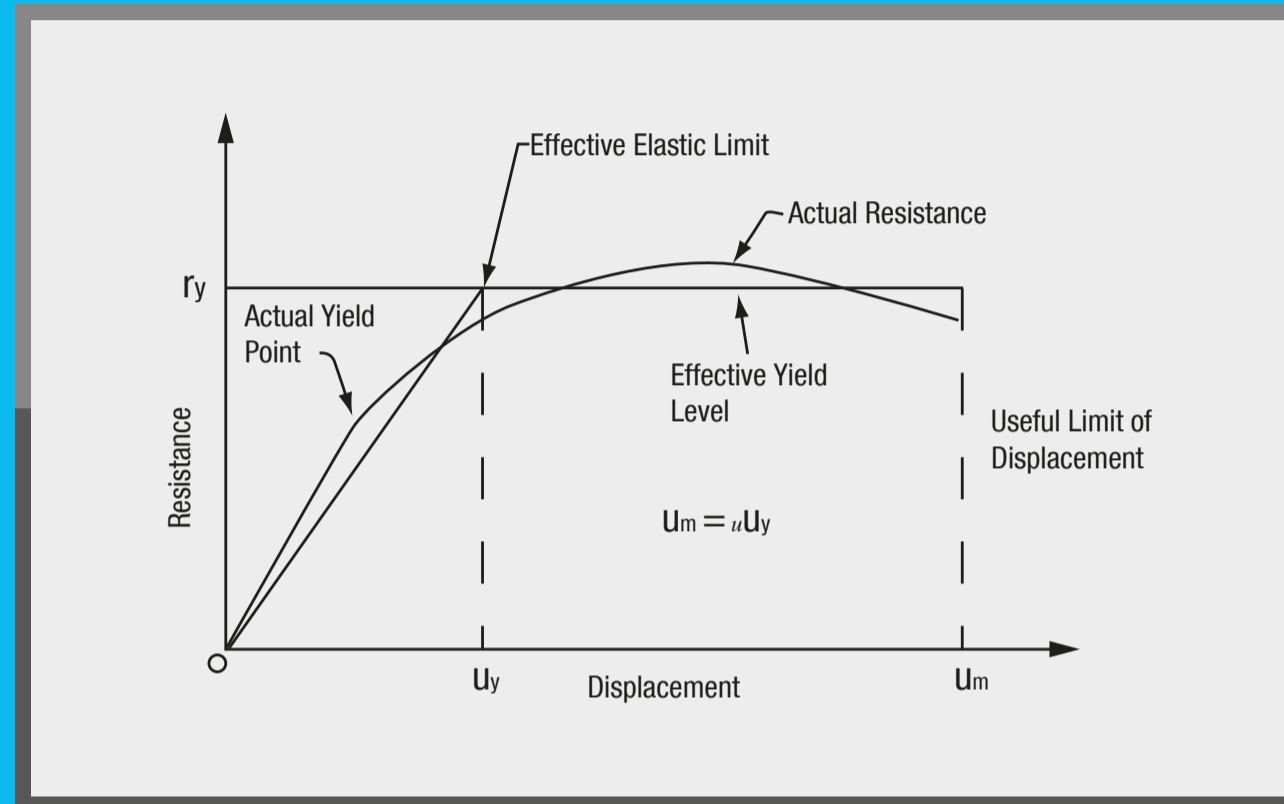


Nepal earthquake, 2015:
 Even single-story structures collapsed, killing all the occupants, as the structures were not built to resist earthquakes.



The steel for Special Moment Resisting Frames (SMRF) conforms to
 NBC 2015/ASTM A-706-15/ACI-318-14/BDS ISO 6935 2-Grade 420DWR

PRINCIPAL PROPERTIES OF EARTHQUAKE RESISTANT STEEL



Earthquake resistant steel should display elastic properties within the design limits of the structural element, e.g. Columns or Beams.

The steel should further display excellent post-yield behavior by strain-hardening. This means the steel should have a Tensile to Yield ratio over 1.25.

Building elements constructed with steel having high Tensile-Yield ratios have the capacity to develop 'plastic hinges' by undergoing 'inelastic rotations'.

Inelastic rotations of building frame elements prevent catastrophic collapse of a building in case of an earthquake.

BSRM Ultima is a steel reinforcement for Special Moment Resisting Frames (SMRF) for the construction of earthquake resistant structures in the country's most active seismic zones.

KEY PERFORMANCE INDICATORS FOR ASTM 706 GRADE 60 BDS ISO 6935-2 : 2016 GRADE 420DWR

Key Indicators	ASTM 706 Grade 60 (420)	BDS ISO 6935-2
Yield strength	60,000 Psi (420MPa)-Minimum, 78,000 Psi (540MPa)-Maximum	60000Psi (420MPa)-Minimum, 79170Psi (546MPa)-Maximum
Ultimate Tensile Strength	80,000 Psi (550MPa)-Minimum	76125 [525 MPa]-Minimum
T/Y Ratio	1.25 (Minimum)	1.25 (Minimum)
Elongation	14%-10mm to 20mm (Minimum) 12%-22mm to 32mm (Minimum) 10%-40mm to 50mm (Minimum)	16% (Minimum)
Bending Requirements	3D-10mm to 16mm, 4D-20mm to 25mm 6D-28mm to 32mm, 8D-40mm to 50mm	3D-08 mm to 16mm, 6D-20mm to 32mm, 7D-36mm to 50mm
Steel Chemistry	Carbon-0.30% (Max), Manganese-1.50% (Max), Phosphorus-0.035% (Max), Sulfur-0.045% (Max), Silicon-0.50% (Max), Carbon Equivalent-0.55% (Max)	Carbon-0.30% (Max), Manganese-1.50% (Max), Phosphorus-0.04 (Max), Sulfur-0.04% (Max) Silicon-0.55% (Max), Carbon Equivalent-0.56% (Max)

WEIGHT CHART (REBAR) BDS ISO 6935-2-2016 REGULAR LENGTH 12 METER/39.5 FEET

Diameter(mm)	Area Square(mm)	Kg/Meter	Meter/Ton	Feet/Ton	Feet/Kg
8	50.27	0.39	2534.31	8312.55	8.3
10	78.54	0.61	1621.96	5320.03	5.3
12	113.10	0.88	1126.36	3694.46	3.7
16	201.06	1.57	633.58	2078.13	2.1
20	314.16	2.46	405.49	1330.00	1.33
22	380.13	2.98	335.12	1099.18	1.10
25	490.87	3.85	259.51	851.20	0.85
28	615.75	4.83	206.88	678.57	0.68
32	804.25	6.31	158.39	519.53	0.52
40	1256.64	9.86	101.37	332.50	0.33
50	1963.50	15.41	64.88	212.80	0.21

