

B420 DINER

স্বচ্ছতা
প্রতিশ্রুতি

ইস্পাত শিল্পে পৃথিবীর সর্বোত্তম উদ্ভাবনী প্রযুক্তি এবং
এশিয়ার প্রথম কোয়ালিটি প্রযুক্তির জিপিএইচ ইস্পাত
উৎপাদন ও বাজারজাত করে দেশীয় নির্মাণ শিল্পে
আমরা উন্নোচন করেছি সমৃদ্ধির নতুন দিগন্ত।
একই সাথে, বিশ্বব্যাপী বাংলাদেশকে পৌঁছে দিয়েছি
গর্বের নতুন উচ্চতায়।



ispat

GOD FEARING
PLAIN LIVING
HIGH THINKING

**“In the beginning,
God created man”**

and after a thousand years of intelligence, precision, hard work and innovation, man created steel – one of the greatest innovations of all time. Modern life is literally unimaginable without steel, from skyscrapers and planes to syringes and forks, steel is an essential part of our everyday life.



GPH ispat Ltd.

GPH ispat Ltd. was incorporated in Bangladesh as a private limited company on May 17, 2006 which was limited by shares under the companies Act, 1994. GPH ispat is one of the leaders of Bangladesh in manufacturing steel, promises a super strong future and economy with its world-class products. GPH ispat Ltd. produces not only structural rebar, but also produces MS billets and sections in Bangladesh. GPH ispat is ensuring the highest quality products in Bangladesh complying the national and international standards. Billets are being exported to other countries after meeting the local demand. The main focus of GPH ispat Ltd. is to take Bangladesh quite a few steps forward to a stronger and brighter tomorrow.

GPH Ispat

Pure, Safe and Clean Construction Steel



The story of GPH Ispat is not an ordinary one. It all began with a vision. A vision for development.

Having belief in sustainable development GPH ispat is continuously working for the development and people's welfare of the country. GPH ispat has established the Asia's first Quantum EAF Technology based factory to enrich the steel sector in Bangladesh. GPH Ispat is one of the leading manufacturing company in Bangladesh that ensures the best quality of steel complying the national and International standards.

GPH Ispat has introduced first in Bangladesh the level 4 Automation in steel manufacturing industry and ERP-enriched state-of-art technology with fully computerize integrated digital industry known as Industry 4.0. This makes it possible to produce the highest quality products using comparatively less energy. The main purpose of all our efforts are to bring you the world class construction Rebar through advanced technology.

We have a big dream, a dream of building a new Bangladesh, and you are the companions in this dream.

Vision

To provide the foundation for building the infrastructure of Bangladesh towards High-Income-Country (HIC) with the true GPH philosophy.

Mission

The trusted brand of Bangladesh leading the steel sector with innovative products leveraging cutting edge technology.

GPH Green Factory:

GPH Ispat established a green factory in Bangladesh with the following features to avoid any harm to the environment.

1. Exhaust Gas Purification Unit:

GPH green factory has highly sophisticated and advance exhaust gas purification system to keep the environment clean and safe. The amount of carbon and dust emissions from the GPH factory is less than the amount set by the World Bank.

2. The Largest Oxygen Plant of Bangladesh:

GPH Ispat's green factory has the largest Air Separation plant in Bangladesh having capacity of 300MT/day. The liquid oxygen, nitrogen and argon produced in this plant meet the factory's own demand and rest are marketed for the use in various hospitals and industrial establishments in the country.



COUNTRY'S LARGEST OXYGEN PLANT



EXHAUST GAS PURIFICATION UNIT

3. Water Treatment Plant with Zero Discharge Technology:

Only GPH Ispat factory in Bangladesh has its own water harvesting system and water treatment plant with zero discharge technology, so no water is wasted.

4. Own Power Plant and Substation:

The factory has a power plant (3 units, 4MW each, Total 12 MW) and 230/33 kV GIS substation for uninterrupted power supply. The amount of electricity saved in this green factory, can be utilized in 1 lakh 92 thousand households per year.

5. Natural Gas Savings:

The amount of natural gas saved in the GPH green factory by establishing Winlink Technology can meet the gas demand of 35,000 households per year.

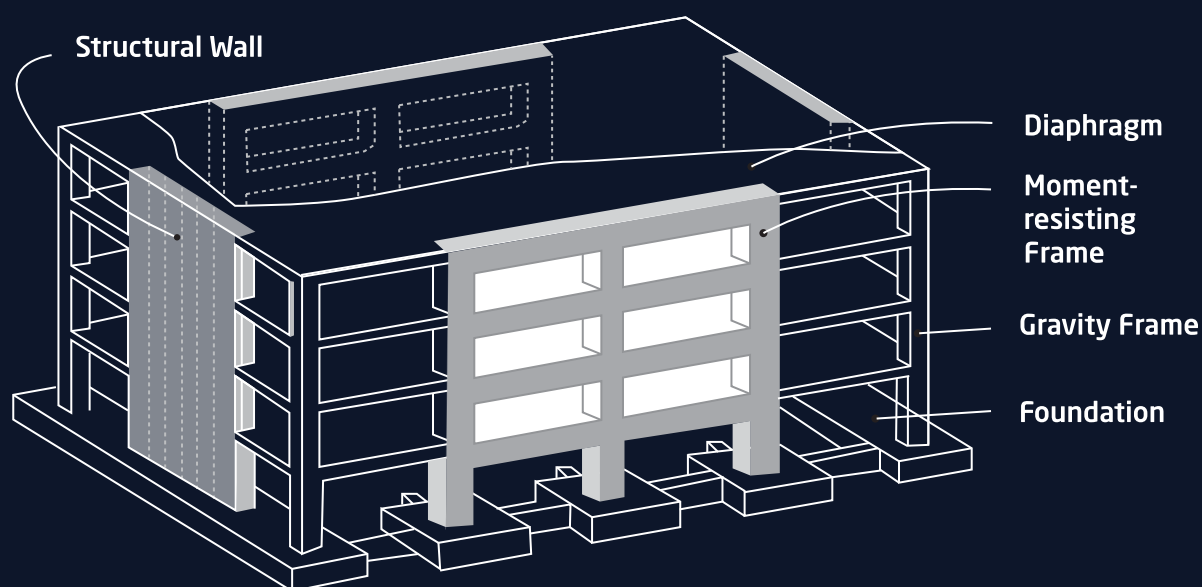


GPH 420DWR: Pure, Safe and Clean Construction Steel for Earthquake Prone Areas

Tectonic framework of Bangladesh and adjoining areas indicate that Bangladesh lies well within an active seismic zone. The after effect of earthquake is more severe in an underdeveloped and a densely populated country like ours than any other developed countries.

Bangladesh National Building Code (BNBC) was first established in 1993 to provide guidelines for design and construction of new structure subject to earthquake ground motions in order to minimize the risk to life for all structures. Bangladesh has divided into four seismic zones according to BNBC - 2020. From seismic design point of view, BNBC 2020 defines three Seismic Design Categories (SDC) of structures: SDC B, SDC C and SDC D. Permissible SDC depends on the Seismic Zone, Site Class and Occupancy Category. Based on these three criteria, the allowable SDC is determined. According to Bangladesh National Building Code BNBC-2020, buildings in earthquake prone areas should be built on Special Moment Frames (SMF). The BNBC states that "Special proportioning and detailing requirements are critical in resisting strong earthquake shaking with substantial inelastic behavior. These moment resisting frames are called Special Moment Frames because of these additional requirements, which improve the inelastic response characteristics of these frames in comparison with less stringently detailed Intermediate and Ordinary Moment Frames."

Although earthquakes cannot be prevented but good reinforcing re-bar with proper strain hardening can be used to reduce their damage. GPH B420DWR Rebar meets all the additional requirements for using in earthquake prone areas.



Why GPH B420DWR Is The Best Construction Steel?

1. Completely Pure & Clean Steel:

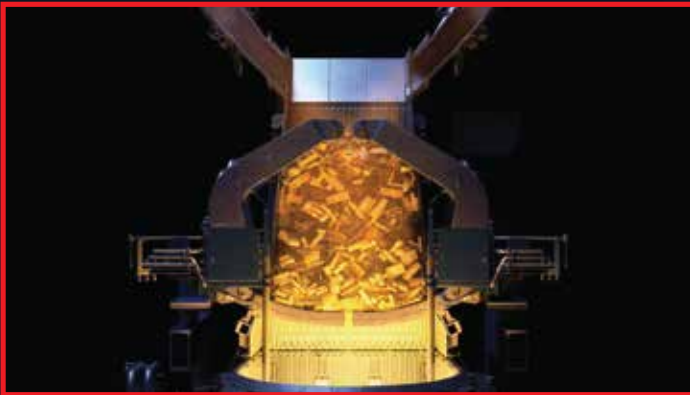
100% refined, Pure & Clean liquid steel produced through Quantum Electric ARC Furnace (QEAF) technology which leads to produce inclusion free GPH Quantum Rebar. Primary refining & cleaning process includes-

Scrap Preheating System: In scrap preheating chamber of an quantum electric arc furnace heats the scrap to a temperature of 600°C & above. During this process it remove the dust, rust, moisture, painting, coating, galvanizing & other primary impurities present in the scrap.

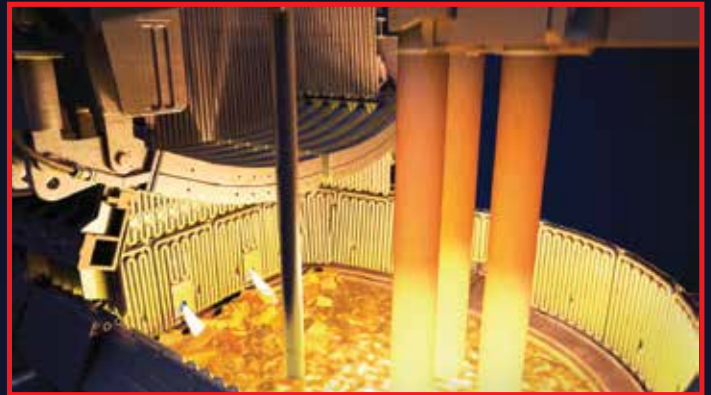
Oxygen Lancing & Argon Bottom Purging: GPH Quantum electric arc furnace removes unnecessary Carbon & Phosphorus by Oxygen Lancing & Argon bottom purging turns the liquid metal mixture into a homogeneous liquid metal mixture.

Flat Bath Operation, FAST & Siphonic Tapping: Pure flat bath operation is done by preparing 70 MT HOT HEEL in Quantum Electric arc furnace having holding capacity of 150 MT. Chemical Reaction of Carbon & Oxygen makes Carbon Mono oxide (CO) which creates Foamy Slag & removes Carbon, Phosphorus & others impurities. 80 MT, 100% slag free liquid metal is collected into the ladle by tilting the furnace at 4-degree angle through bottom tapping in a Furnace Advance Slag Free Tapping (FAST) & Siphonic process.

GPH Quantum Rebar is much more Seismic Resistance than other rebars in the market due to its 100% refinement. Engineers rely on GPH Quantum Rebar for any Mega Structures.



PREHEATING CHAMBER



OXYGEN LANCING

FLAT BATH OPERATION & FAST BOTTOM TAPPING



2. Homogenized Chemical Mixture:

Homogenized chemical composition in liquid steel ensured by Argon bottom purging & harmful Phosphorus & other impurities are removed from the liquid metal by Oxygen lancing in Quantum Electric Arc Furnace. Chemical composition in GPH rebar is ensured by mixing the required ferro-alloys in LRF through automatic alloy addition. So, the homogenized chemical properties are achieved in the rebar resulting uniformity of strength along the rebar and the construction become stronger and safer.



3. Steel with High Ductility and Firm Bonding Strength:

Better combination of chemical composition makes GPH Rebar more ductile and use of Tungsten Carbide Roll & notching, grooving through CNC machines ensures the uniform diameter of the rebar, minimum weight tolerances, accurate surface geometry resulting higher relative rib area that makes the construction more secured by increasing fatigue resistance & establishing a strong bond between the concrete and the rebar.



CONTINUOUS CASTING MACHINE



HOUSING-LESS FREE FLOATING ROLLING STAND

4. Uniform Strength and Corrosion Resistant:

Fully automatic computerized Quenching Method ensures a uniform martensite ring in the rebar; that is why there is no strength variations from head to tail.

Rebar produced from 100% refined liquid steel, less twisting of rebar during production and automatic quenching system creates a light anti corrosive scale layer on the rebar surface which makes the rebar more corrosion resistant.



TMT QUENCHING BOX



HIGH SPEED TWIN CHANNEL

5. Higher Bendability:

Combination of proper chemical composition & uniform structures of tempered martensite, Mixed Bainite and ferrite-pearlite makes the rebar highly bendable.

6. Shiny Surface:

The use of maximum number of finishing stands with tungsten carbide rolls in the rolling process makes the surface of the GPH rebar shiny.



TUNGSTEN CARBIDE ROLL

7. Quality Consistency:

For quality control we have fully digital Universal Testing Machine, Universal Hardness Testing Machine, Profilometer, Bend-rebend Testing Machine, X-ray Fluorescence Spectrometer (XRF), Microscope, Impact Testing Machine, Bond testing, Martensite ring checking, Macro Etching and Wet Chemical Lab. Moreover, we have advanced M12 Spectrometer from Germany. At each stage of production, the state-of-the-art GPH lab is rigorously controlled by these testing machines to maintain the quality of the rebar.



XRF MACHINE



BEND & REBEND TESTING MACHINE



M12 SPECTROMETER



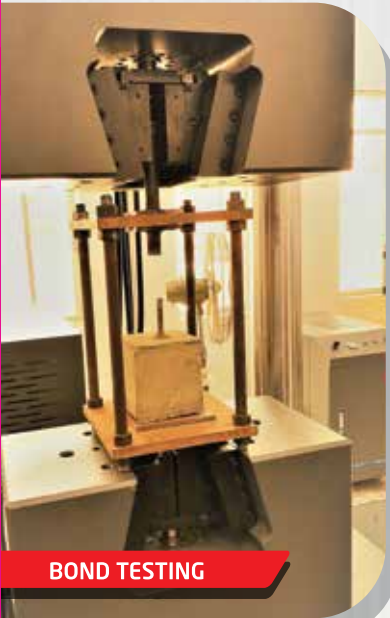
PROFILOMETER

Since every stage of GPH rebar production such as scrap processing and charging, melting, refining, casting and rolling processes are integrated and uninterrupted and the use of the world class technology ensure balanced chemical properties and uniform strength, superior ductility and bendability that guarantee a strong structure.



RING TESTING

RING TESTING MICROSCOPE



BOND TESTING

UNIVERSAL HARDNESS TESTING MACHINE



MICROSCOPE



AUTOMATIC FINE POLISHING MACHINE



CHARPY IMPACT TESTING MACHINE



MACRO ETCHING SETUP



UNIVERSAL TESTING MACHINE

Nominal Weight, Dimension and Dimensional Tolerance of GPH B420DWR as per BDS ISO 6935-2:2016:

Nominal Diameter	Nominal Weight	Permissible Tolerance	Cross-sectional Area	Length (Per ton)		Ton and Piece Count (1 pc=12 meter approx.)
				m	ft	
mm	kg/m	%	mm ²	m	ft	no of bar
8	0.395	±8	50.3	2534.31	8314.66	211 (1 ton)
10	0.617	±6	78.5	1621.96	5321.38	135 (1 ton)
12	0.888	±6	113	1126.36	3695.40	94 (1 ton)
16	1.58	±5	201	633.58	2078.67	53 (1 ton)
20	2.47	±5	314	405.59	1330.35	34 (1 ton)
25	3.85	±4	491	259.51	851.42	22 (1 ton)
28	4.84	±4	616	206.88	678.75	18 (1 ton 45 kg)
32	6.31	±4	804	158.39	519.67	14 (1 ton 60 kg)
40	9.86	±4	1257	101.37	332.59	9 (1 ton 65 kg)
50	15.42	±4	1964	64.88	212.86	6 (1 ton 110kg)

Mechanical Properties of Grade B420DWR as per BDS ISO 6935-2:2016:

Steel Grade	Ductility Class	International Standard	Yield Strength		Tensile Strength	Elongation at Max force, Agt	TS/YS	Elongation after Fracture	Bend Test	Re-Bend Test	Rib Geometry			
			60900 Psi (Min)	79170 Psi (Max)							Gauge Length=200 mm	Gauge Length=5D mm	Mandrel Diameter mm	Mandrel Diameter mm
B420DWR	D	BDS ISO 6935-2:2016	60900 Psi (Min)	79170 Psi (Max)		8 % (Min)	1.25 (min.)	16 % (Min)	≤16mm: 3D 16mm<D≤32 mm: 6D 32mm<D≤50 mm: 7D	≤16mm: 5D 16mm<D≤25 mm: 8D 25mm<D≤50 mm: 10D	0.065D (min.)	0.15D (max.)	D<10: 0.5D-1.0D D≥10: 0.5D-0.8D	6 < D ≤ 12 f _R ≥ 0.040 D > 12 f _R ≥ 0.056
			420 MPa (Min)	546 MPa (Max)										

*Relative rib area as per BDS 4449-2005+A3:2016



Mechanical Properties of Grade-60 as per ASTM A706/A706M-15:

Steel Grade	International Standard	Yield Strength		Tensile strength (TS) MPa	Elongation at Max force, EMF	TS/YS	Elongation after fracture	Bend Test	Rib Geometry			
		60000 PSI (Min), 420 MPa (Min)	78000 PSI (Max), 540 MPa (Max)						80000 PSI (Min), 550 MPa (Min)	Gauge Length = 200 mm	Mandrel Diameter mm	Transverse Rib Height, mm
G60 [420]	ASTM A706/A706M-15	60000 PSI (Min), 420 MPa (Min)	78000 PSI (Max), 540 MPa (Max)	80000 PSI (Min), 550 MPa (Min)	-	1.25 (Min)	14 % for 10 - 20mm 12 % for 25-32mm	≤16mm: 3D 16mm <D≤25mm: 4D 25mm <D≤32mm: 6D	0.065D (min.)	0.15D (max.)	D<10: 0.5D -1.0D D≥10: 0.5D -0.8D	6 < D ≤ 12 f _R ≥ 0.040 D > 12 f _R ≥ 0.056

* Transverse Rib Height, Longitudinal Rib, Rib Spacing as per BDS ISO 6935-2:2016 and Relative rib area as per BS 4449-2005+A3:2016

Mechanical Properties of Grade-60 as per ASTM A615/A615M-16

Steel Grade	International Standard	Yield Strength		Tensile strength (TS)	Elongation at Max force, EMF	TS/YS	Elongation after fracture	Bend Test	Rib Geometry			
		60000 PSI (Min), 420 MPa (Min)	90000 PSI (Max), 620 MPa (Min)						90000 PSI (Min), 620 MPa (Min)	Gauge Length = 200 mm	Mandrel Diameter mm	Transverse Rib Height, mm
G60 [420]	ASTM A615/A615M-16	60000 PSI (Min), 420 MPa (Min)	90000 PSI (Max), 620 MPa (Min)	90000 PSI (Min), 620 MPa (Min)	-	-	9 % for 10 - 20mm 8 % for 22 - 25mm 7 % for 28-32mm	≤16mm: 3.5D 16mm <D≤25 mm: 5D 25mm <D≤32 mm: 7D	0.065D (min.)	0.15D (max.)	D<10: 0.5D-1.0D D≥10: 0.5D-0.8D	6 < D ≤ 12 f _R ≥ 0.040 D > 12 f _R ≥ 0.056

* Transverse Rib Height, Longitudinal Rib, Rib Spacing as per BDS ISO 6935-2:2016 and Relative rib area as per BS 4449-2005+A3:2016

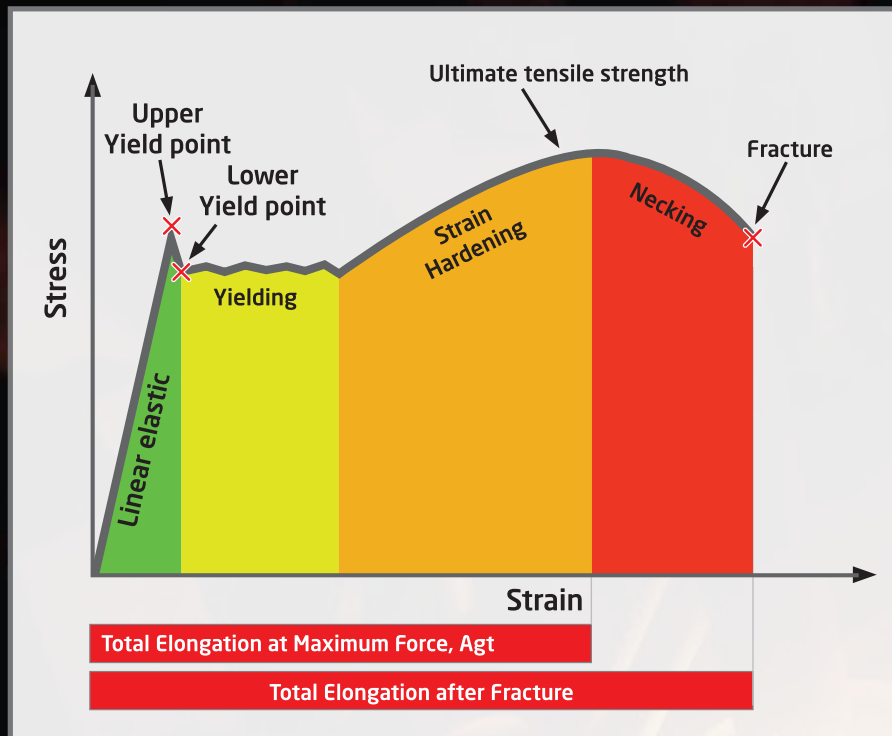


Figure: Typical Stress -Strain Curve of Low Carbon Steel

Standard Specification :

GPH B420DWR Rebar conform to the following national and international standard specifications:

- (a) ASTM A615/A 615M-16 Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement¹ (American standard). Gr-60[420],
- (b) ASTM A706/A706M-15 Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement¹ (American standard). Gr-60[420],
- (c) BDS ISO 6935-2:2016 Steel for the Re-enforcement of Concrete, Part-2 Ribbed bars (Bangladesh Standard). (B420DWR)
- (d) JIS G 3112:1987-Steel bars for concrete reinforcement (Japanese Standard). (SD390)
- (e) IS 1786:2008 High strength deformed steel bars and wires for concrete reinforcement (Indian Standard). (Fe 415)
- (f) GB/ T 1499.2-2018 Steel for the Reinforcement of concrete Part 2: Hot rolled ribbed bars (Chinese standard). (HRB400, HRBF400)
- (g) DIN 488-1:1984 Steel rebar - reinforcing of concrete (German Standard). (BSt 420S)

Bond Performance:

As per BS 4449:2005, defined by characteristic relative rib area (f_R) as follows:

$$6 < d \leq 12 \quad f_R \geq 0.040$$

$$d > 12 \quad f_R \geq 0.056$$

Results are obtained from fully automatic rebar surface geometry measurement device (Profilometer)

ECM Datensysteme RM-303

Made: Germany

Surface Geometry Measurement :

Row	Diameter		Rib Height			Rib dist.c (mm)	Inclination		Row dist.e (mm)	Head width (mm)	Rib. length (mm)	Long.rib. Height (mm)	Relative rib area f_R
	Nom. (mm)	Real (mm)	Center (mm)	1/4 Pnts (mm)	3/4 Pnts (mm)		Alpha (°)	Beta (°)					
1	16.0	15.94	1.53	1.44	1.22	10.5	55	66	2.43	1.20	24.9	1.06	+82.1%
2			1.59	1.39	1.50	10.5	53	64	2.43	1.30	25.3	0.97	
Mean			1.56	1.42	1.36	10.5	54.0	65	Σ:4.86	1.25	RL.W	1.02	



AUTOMATIC RIB MEASUREMENT MACHINE

Chemical composition of product analysis as per international standard (G-60/B420DWR):

Element	BDS ISO 6935-2: 2016	ASTM A706/A706M-15	ASTM A615/A615M-16
%C	0.33 max.	0.33 max	-----
%Si	0.60 max.	0.55 max.	-----
%Mn	1.56 max.	1.56 max.	-----
%P	0.048 max.	0.043 max.	0.075 max
%S	0.048 max.	0.053 max	-----
%N	0.012max.	-----	-----
%CEV	0.61 max.	0.59 max.	-----

Carbon Equivalent Value [BDS ISO 6935-2: 2016], CEV will be calculated using below equation,

$$CEV = C + \frac{Mn}{6} + \frac{(Cr + V + Mo)}{5} + \frac{(Cu + Ni)}{15}$$

where C, Mn, Cr, V, Mo, Cu and Ni are the mass fractions, expressed as percentages of the respective chemical elements of the steel.

Carbon Equivalent Value [ASTM A706/A706M-15], CEV will be calculated using below equation,

$$C.E. = \% C + \frac{\% Mn}{6} + \frac{\% Cu}{40} + \frac{\% Ni}{20} + \frac{\% Cr}{10} - \frac{\% Mo}{50} - \frac{\% V}{10}$$



The Bangladesh We Want to Build

GPH's journey is based on its determination to build Bangladesh on a strong and solid foundation. Our country will be witnessing world class factories, huge buildings, international standard roads, highways, flyovers, bridges, tunnels and many other facilities. An outstanding installation will be made in this country, which will attract tourists from home and abroad. A stadium will be built where the Olympic or World Cup will be held. We want to build this better Bangladesh with you.





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