Why Rahim Steel RSM B420DWR?

The first "B" stands for steel for reinforcing concrete. The next 3 digits represent the specified characteristics value of minimum upper yield strength. The fifth symbol stands for ductility class. The sixth symbol "W" means intended for welding. The last "R" stands for ribbed bar.

Salient Features of Ductility Class "D":

• According to BDS ISO 6935-2:2016, the highest ductility class is "D" among the four ductility class. The Elongation at Maximum Force (EMF) is 8% in this class, which is very much effective in earthquake prone zone.

• The ratio of tensile strength and yield strength (TS/YS) is minimum 1.25, which is one of the major requirements of American Concrete Institute (ACI) and Bangladesh National Building Code (BNBC) especially on earthquake prone zone.

• Due to its maximum yield strength range, the structural designers will have a great flexibility on yield point (fy) design.

• The major provisions of the Ductility class "D" are complying with Low Alloy Steel Standard: ASTM A706/A706M, which is widely acceptable by the structural engineers

Billet & Slab Making in Rahim Steel Plant

Steel is a dynamic, versatile and eco-friendly product with diverse use and applications. The raw materials which are used for making steel are steel scrap, sponge iron and Hot Briquetted Iron (HBI). Sponge Iron and Hot Briquetted Iron (HBI) are imported from abroad.



Sponge iron/HBI and steel scrap charged into the induction furnace in a specific ratio. After the complete melting of charge, the hot liquid metal samples are taken to analyze the chemical ingredients present, i.e. carbon, manganese, silicon, phosphorous, sulphur etc.

Oxides are formed in the furnace which are lighter than molten steel and therefore float above as slag. This slag primarily contains impurities, that are extracted by tilting the furnace in 15 degrees angle.



Ladle Furnace is the second stage of steel refining. After removing the impurities, samples of the molten steel is collected and send to the laboratory for chemical composition evaluation. Depending on the results, necessary amount of refining additives are added.

In the LRF the molten steel is reheated by arcing again with graphite electrode. A second sample is then collected and analyzed for adding necessary Ferro-Alloy to produce particular grade of steel. During final stage of refining argon gas is blown through the molten steel to eliminate the remaining impurities and homogenize the composition of the steel.



The temperature of liquid metal is raised to 1600-1650 degree centigrade for casting. For billet casting, the liquid steel is poured into the ladle and the ladle is then taken to Continuous Casting Machine - CCM for billet casting.







Rahim Steel Mills Co. Pvt. Ltd.

RSM B420DWR

Mechanical Property:

Steel Grade	Standard	Frog Mark	Yield Strength (MPa)		TS/YS Ratio	Elongation% (GL = SD)	
			Min	Max	Min	Min	
B420DWR	BDS ISO 6935-2:2016	RSM// Dia // B420DWR	420	1.3xYS(min)	1.25	16	

Chemical Property:

Steel Grade	Standard	Frog Mark	C% (Max)	Mn% (Max)	Si% (Max)	S% (Max)	P% (Max)	CEV% (Max)
B420DWR	BDS ISO 6935-2:2016	RSM// Dia // B420DWR	0.30	1.50	0.55	0.040	0.040	0.56

Rahim Steel TMT Process

RAHIM STEEL is using the world prominent latest STS technology to develop Thermo Mechanically Treated (TMT) rebars. The deformed bars are produced in state-of-the-art plants under the close supervision of high-caliber metallurgists and engineers. RSM B420DWR rebars are hot rolled from steel billets and subjected to PLC controlled on line thermo mechanical treatment in three successive stages.

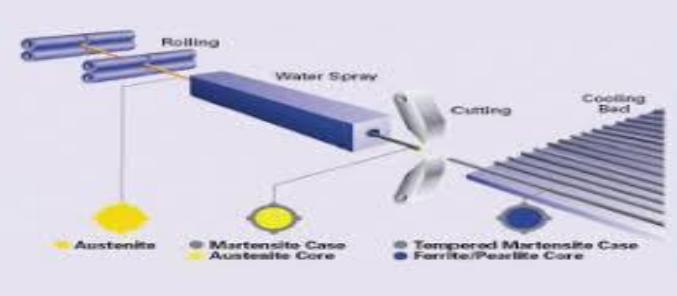
Quenching: The hot rolled bar leaving the final mill stand is rapidly quenched by high pressure water in special

Steel Grade	Standard	Frog Mark	Yield Strength (MPa)		UTS (MPa)		TS/YS Ratio	Elongation% (G.L=8* or 200mm)
			Min	Max	Min	Max	Min	
60	ASTM A706/A706M	RSM 60//Dia//420	420 (60000 PSI)	540 (78000 PSI)	550 (80000 PSI)	----	1.25	(10,12,16,20) mm: 14% (22.25,28,32) mm: 12%
60	ASTM A615M	RSM 60//Dia//420	420 (60000 PSI)	-------	620 (90000 PSI)	-----	------	(10,12,16,20) mm: 9% (22,25) mm: 8% (28 to above) mm: 7%

venturi tubes. This hardens the surface of the bar to a depth optimized for each section through formation of magnetic rim, while the core remains hot and austenitic.

Self Tempering: As the bar leaves the quenching venturi tube the core remains hot compared to the surface, allowing heat to flow from the core to the surface which causes tempering of the outer martensitic layer into a structure called Tempered Martensite. The core still remains austenitic at this stage.

Atmospheric Cooling: This takes place on the cooling bed, where the austenitic core is transformed into a ductile ferrite-pearlite structure. Thus the final structure consists of an optimum combination of strong outer layer (tempered martensite) with a ductile core (ferrite-pearlite). This gives RSM rebars a unique combination of high strength and ductility.





Application

Rahim Steel RSM B420DWR	Due to its higher uniform elongation and excellent bend ability, it could be used in all type of RCC structures as well as earthquake prone zone. It is now widely used in various government projects of PWD, LGED, RHD, DPHE, EED, RAJUK, WASA, City Corporation, MES etc.

Rahim Steel Mills Co. Pvt. Ltd.

RSM 60 (420)

Mechanical Property:

Chemical Property:

Steel Grade	Standard	C% (Max)	Mn% (Max)	Si% (Max)	S% (Max)	P% (Max)	CEV% (Max)
60	ASTM A706/A706M	0.30	1.50	0.50	0.045	0.035	0.55
60	ASTM A615M	-------	-------	--------	0.060	0.060	0.55

Billet Reheating and Hot Rolling

- This process initially starts from the Re-heating furnace.
- Stacking of billets is done on the hot charging area through overhead crane.
- Continuous pushing of billets, that are placed parallel to each other, is then followed through hydraulic or mechanical pusher.
- Different zones are divided in the furnace depending on the capacity of hourly heating for temperature control.
- The billets are then heated to their discharge temperature through air along with colossal burners in the furnace.
- Through Ejectors the material is drawn out once the billet has reached the "Discharged Door" and moreover the computer system has determined that the billet has been effectively heated.



After this process, rescaling is carried out. This is done by passing the billet all the way through the rescaling unit. Pressurized water is used to dispatch the thick layer of oxidized iron collected at the surface of the billet during the stage inside the reheat furnace. After successful rescaling, the billet has to go through slitting systems. These are mainly utilized for permitting the rolling of rebars in several stands. This helps in augmenting the productivity of rebars of small size considerably, keeping the speed of finishing constant.



The process is further continued with roughing. For this, a roughing mill is used, which is made up of different independent rolling stands. Rolling of billets, that are heated in the furnace, is done continuously till they obtain bright orange-yellow color. After this, high pressure water jets are used for cleaning of scale or oxidized iron.

The thickness of the leading edge of the bar is then estimated once the transfer bar exits the final roughing mill stand. The temperature profile, from top to bottom, of the produced bar is then measured by a pyrometer.

Application

Rahim Steel RSM 60 (420)	Suitable for all kinds of RCC structures where high bond value with concrete and high strength is desired.

Rahim Steel Weight Table of Ribbed Bar

Normal Dia (MM)	Actual Dia (MM)		Unit Weight (KG/M)	
	Min.	Max.	Min.	Max.
8	7.8	7.95	0.375	0.390
10	9.8	9.95	0.592	0.610
12	11.8	11.95	0.858	0.880
16	15.8	15.95	1.540	1.568
20	19.8	19.95	2.417	2.454
22	21.8	21.95	2.930	2.970
25	24.8	24.95	3.792	3.838
28	27.8	27.95	4.765	4.816
32	31.8	31.95	6.235	6.294
40	39.8	39.95	9.766	9.840