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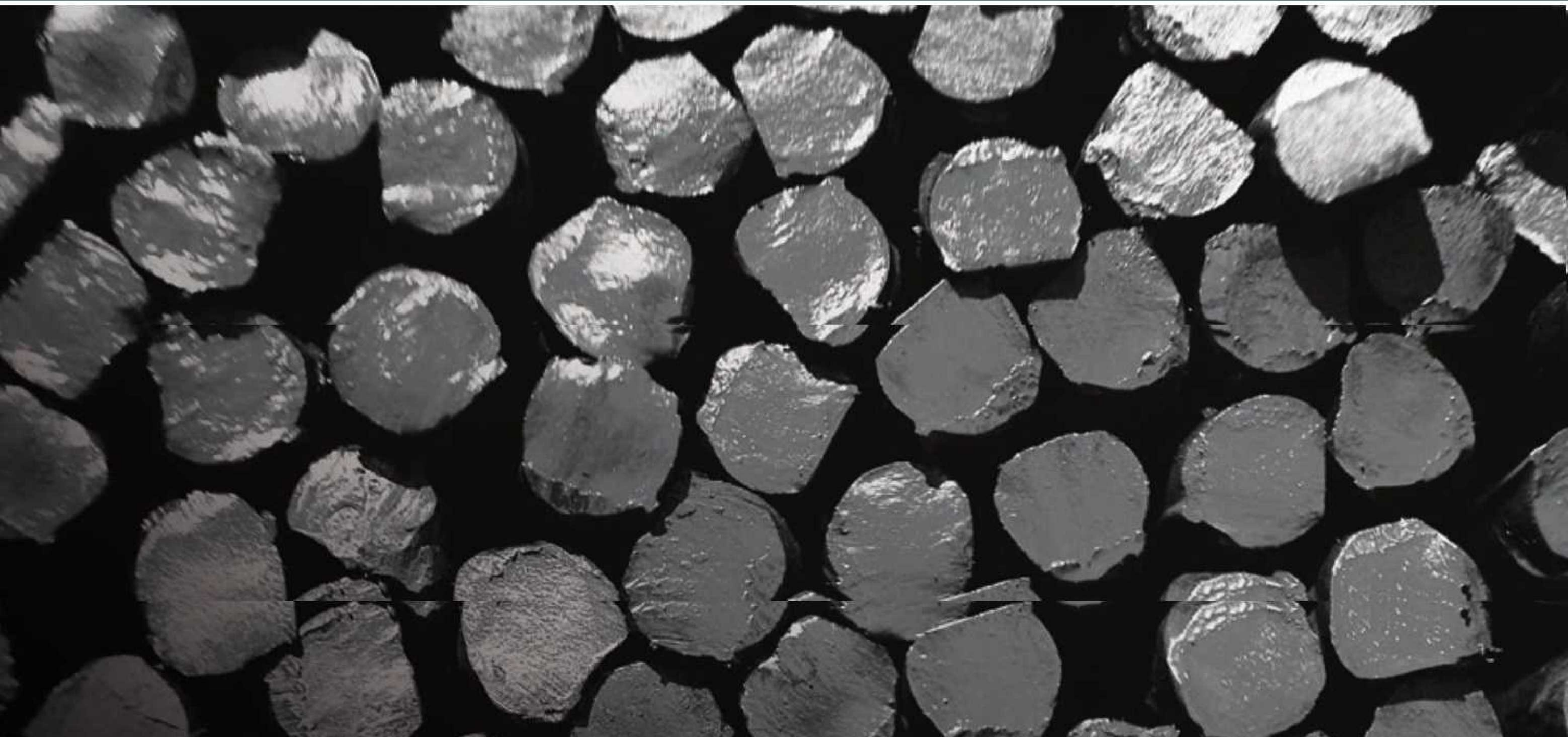


STEEL PRODUCTS

REBAR AND WIRE ROD
MANUFACTURED TO EXACTING STANDARDS

TECHNICAL SPECIFICATIONS

INDEX

SYMBOLS AND TERMS

Symbol/Term	Unit	Description
CEV	%	Carbon equivalent value.
El.	%	Percentage elongation after fracture.
A_{gt}	%	Percentage total elongation at maximum force.
YS	MPa	Yield strength: the maximum stress that can be applied along axis before material begins to change shape (plastic deformation).
TS	MPa	Tensile strength: the maximum stress that can be applied to a material before breaking.
TS/YS	–	Ratio of tensile strength to yield strength.
Ductility Class	–	Classification of the ductility properties of rebar based on the value of TS/YS, as well as the elongation measured either as A_{gt} or El.
ISO	–	International Organization for Standardization.
ASTM	–	ASTM International Standard (formerly American Society for Testing and Materials).
EN	–	European Standard.
BS	–	British Standard.
JIS	–	Japanese Industrial Standard.

SECTION 1: REBAR

1. REBAR IN BUNDLE

1.1 Produced Sizes

The factory produces plain and deformed reinforcing steel bars in bundle form from size Ø 10 mm to Ø 40 mm as follows:

Diameter (mm)	10	12	14	16	18	20	22	25	28	30	32	40

Any special size from Ø 10 mm to Ø 40 mm can be produced with 0.5 mm increment in diameter according to customer request.

1.2 Rebar Length

Rebar is produced with length of 6 m up to 24 m according to customer request. Standard produced bar length is 12 m.

1.3 Bundle Weight

The factory produces bundles with uniform number of bars per bundle size-wise. Weight of each bundle is about 2.0 tons for standard bar length of 12 m. Bundle weight varies between 1.0 and 4.0 ton according to bundle length.

1.4 Bundle Packaging

Compact packaging with six double ties of 7 mm wire for standard length of 12 m. For other bar lengths, number of ties ranges from 4 to 9 according to bar length.

2. REBAR IN COIL

2.1 Produced Sizes

Plain and deformed reinforcing steel bars in coil form are available as follows:

Plain rebar in coil:

Diameter (mm)	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0
	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0
	13.5	14.0	14.5	15.0	15.5	16.0		

Deformed rebar in coil:

Diameter (mm)	6.0	8.0	10.0	12.0	14.0	16.0

Any special size from Ø 6.0 mm to Ø 16.0 mm can be produced with 0.5 mm increment in diameter according to customer request.

2.2 Coil Weight

About 2.0 tons.

2.3 Coil Dimensions

Inner diameter: 800–850 mm.
Outer diameter: 1,200–1,250 mm.
Coil height: 2,000 mm maximum (varies with produced size).

2.4 Coil Packaging

Compact packaging with 4 ties of 7 mm wire. Ties are either single or double according to size, destination and customer request. Bellyband is applied for export shipments.

3. PRODUCIBLE STANDARDS

The Factory produces rebar according to the national and international standards:

3.1 Egyptian Standards
ES 262-1/2015, ES 262-2/2015

3.2 International Standards
ISO 6935-1:2007, ISO 6935-2:2019

3.3 American Standards
ASTM A615M -16, ASTM A615M -18$^{\varepsilon 1}$
ASTM A706M -16, ASTM A510M -18

3.4 British Standard
BS 4449:2005 + A3:2016

3.5 French Standards
NF A 35-016:1996, NF A 35-080-1:2013

3.6 Canadian Standard
CSA G30.18-09 (R2019)

3.7 Ukrainian Standard
DSTU 3760:2006

Other standards can be produced upon customer request. Please contact sales team for more details.

3.1 Egyptian Standards

Standard	ES: 262 – 1/2015, ISO: 6935 – 1:2007	Issuing Country	Egypt	

Grade	Chemical Composition (Maximum %)							Mechanical Properties (Minimum)				
	C	Si	Mn	P	S	N	CEV [1]	Yield Strength (MPa)	Tensile Strength (MPa)	Tensile to Yield Ratio	El. (%)	A_{gt} (%)
B240A-P	–	–	–	0.060	0.060	–	–	240	–	1.02	20	2
B240B-P										1.08		5
B240C-P										1.15		7
B240D-P	–	–	–	0.050	0.050	–	–	240	520 max.	1.25	22	8
B300A-P	–	–	–	0.060	0.060	–	–	300	–	1.02	16	2
B300B-P										1.08		5
B300C-P										1.15		7
B300D-P	–	–	–	0.050	0.050	–	–	300	600 max.	1.25	19	8
B420D-P	0.30	0.55	1.50	0.040	0.040	0.012	0.56	420–540	–	1.25	16	8
B420DWP												

[1] $CEV = \%C + \frac{\%Mn}{6} + \frac{\%Cr+\%Mo+\%V}{5} + \frac{\%Ni+\%Cu}{15}$

Standard	ES: 262 – 2/2015, ISO: 6935 – 2:2007	Issuing Country	Egypt

Grade	Chemical Composition (Maximum %)							Mechanical Properties (Minimum)				
	C	Si	Mn	P	S	N	CEV [1]	Yield Strength (MPa)	Tensile Strength (MPa)	Tensile to Yield Ratio	El. (%)	A_{gt} (%)
B300A-R	–	–	–	0.060	0.060	–	–	300	–	1.02	16	2
B300B-R										1.08		5
B300C-R										1.15		7
B300D-R	–	–	–	0.050	0.050	–	–	300	–	1.25	17	8
B300DWR	0.27	0.55	1.50	0.040	0.040	0.012	0.49	300–390				
B350DWR	0.27	0.55	1.60	0.040	0.040	0.012	0.51	350–455	–	1.25	17	8
B400A-R	–	–	–	0.060	0.060	–	–	400	–	1.02	14	2
B400B-R										1.08		5
B400C-R										1.15		7
B400AWR	0.22	0.60	1.60	0.050	0.050	0.012	0.50	400	–	1.02	14	2
B400BWR										1.08		5
B400CWR										1.15		7
B400DWR	0.29	0.55	1.80	0.040	0.040	0.012	0.56	400–520	–	1.25	17	8
B420DWR	0.30	0.55	1.50	0.040	0.040	0.012	0.56	420–546	–	1.25	16	8
B500A-R	–	–	–	0.060	0.060	–	–	500	–	1.02	14	2
B500B-R										1.08		5
B500C-R										1.15		7
B500AWR	0.22	0.60	1.60	0.050	0.050	0.012	0.50	500	–	1.02	14	2
B500BWR										1.08		5
B500CWR										1.15		7
B500DWR	0.32	0.55	1.80	0.040	0.040	0.012	0.61	500–650	–	1.25	13[2]	8

[1] $CEV = \%C + \frac{\%Mn}{6} + \frac{\%Cr+\%Mo+\%V}{5} + \frac{\%Ni+\%Cu}{15}$

[2] Manufacturing standard elongation ≥ 14%.

3.1.1 New Steel Grade B500DWR

TABLE 1 – COMPARISON OF MECHANICAL PROPERTIES OF STEEL GRADES B500DWR AND B400B-R

Property		Steel Grade	
		B400B-R (Ordinary Rebar)	B500DWR (New Ezz Steel Product)
Yield strength (YS, MPa)		≥400	500–650
Tensile strength to yield strength ratio (TS/YS)		≥1.08	≥1.25
Elongation (%)	after fracture	≥14	≥13[1]
	at max. force (A_{gt})	≥5	≥8
Earthquake-resistance		Non earthquake-resistant (non-seismic)	Earthquake-resistant (seismic)
Weldability		Non-weldable	Weldable

ADVANTAGES OF STEEL GRADE B500DWR:

- Highest yield strength and tensile strength in the Egyptian standard ES 262-2/2015.
- Highest ductility class in the Egyptian standard ES 262-2/2015.

  Ductility class = tensile strength to yield strength ratio ≥ 1.25.
- The combination of high strength and ductility provides proofing against excessive loads such as earthquakes, as follows:

  a) When the applied stress (load) reaches the yield point, the steel still can absorb more energy before failure.

  b) Thus, the period from yielding till failure allows enough time to evacuate the building in case of any earthquake.
- Weldable.

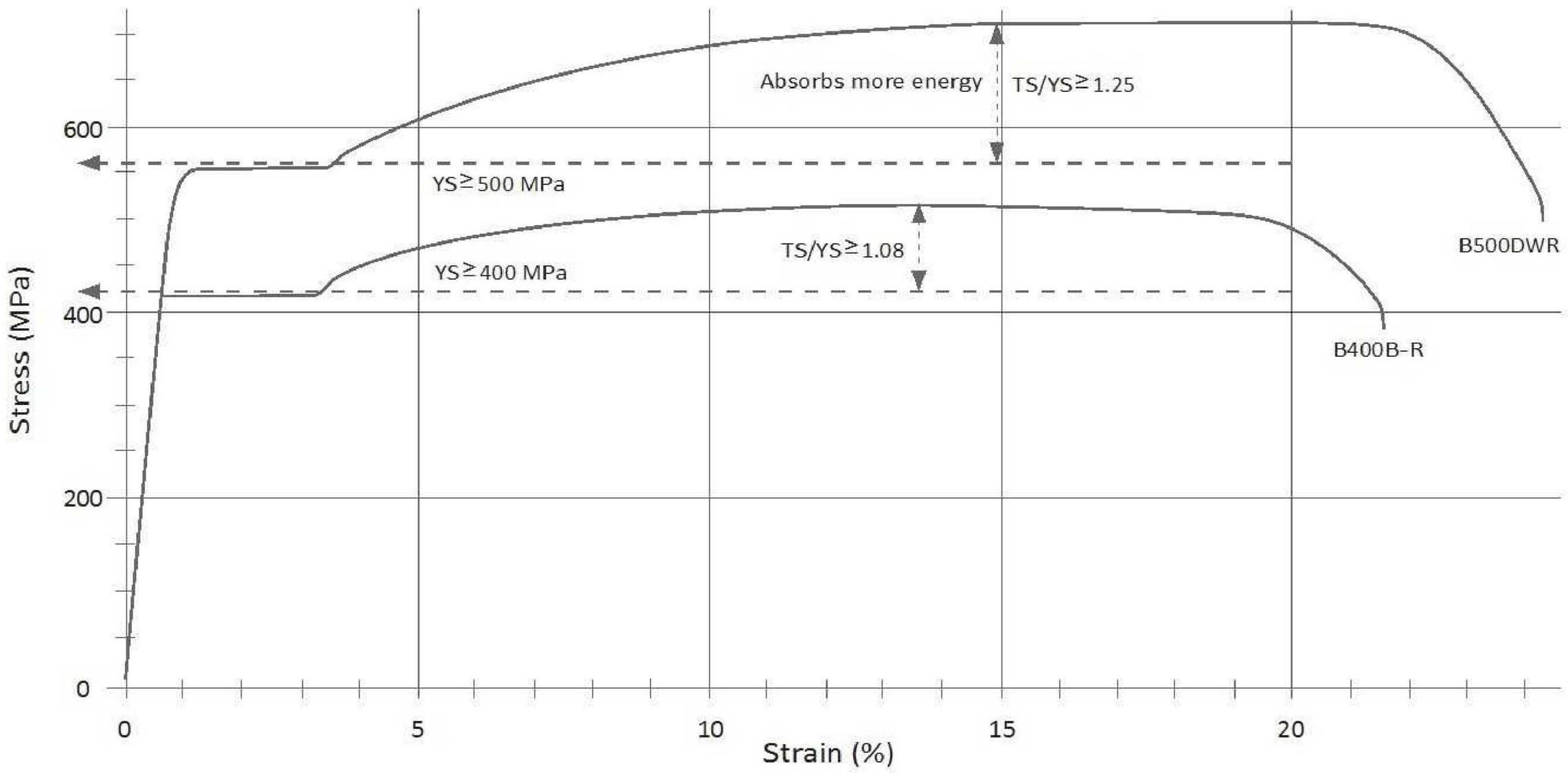


Figure 1: Comparison of Stress-Strain Curve of Steel Grades B500DWR and B400B-R

Figure 1 shows that:

- B500DWR has higher yield strength than that of B400B-R by 25%.
- B500DWR has higher tensile strength to yield strength ratio of 1.25 while the same ratio of B400B-R is 1.08.
- If the applied stress on the rebar exceeds its yield strength, such as through excessive loads generated by earthquakes, the rebar deforms plastically to a much larger extent without exceeding its ultimate tensile strength – this is due to its higher yield strength and TS/YS ratio. Thus, grade B500DWR is earthquake-resistant.

3.2 International Standards

Standard	ISO 6935 – 1:2007	Issuing Country	International

Grade	Chemical Composition (Maximum %)							Mechanical Properties (Minimum)				
	C	Si	Mn	P	S	N	CEV [1]	Yield Strength (MPa)	Tensile Strength (MPa)	Tensile to Yield Ratio	El. (%)	A_{gt} (%)
B240A-P	–	–	–	0.060	0.060	–	–	240	–	1.02	20	2
B240B-P										1.08		5
B240C-P										1.15		7
B240D-P	–	–	–	0.050	0.050	–	–	240	520 max.	1.25	22	8
B300A-P	–	–	–	0.060	0.060	–	–	300	–	1.02	16	2
B300B-P										1.08		5
B300C-P										1.15		7
B300D-P	–	–	–	0.050	0.050	–	–	300	600 max.	1.25	19	8
B420D-P	0.30	0.55	1.50	0.040	0.040	0.012	0.56	420–540	–	1.25	16	8
B420DWP												

[1] $CEV = \%C + \frac{\%Mn}{6} + \frac{\%Cr+\%Mo+\%V}{5} + \frac{\%Ni+\%Cu}{15}$

Standard	ISO 6935 – 2:2019	Issuing Country	International

Grade	Chemical Composition (Maximum %)							Mechanical Properties (Minimum)				
	C	Si	Mn	P	S	N	CEV [1]	Yield Strength (MPa)	Tensile Strength (MPa)	Tensile to Yield Ratio	El. (%)	A_{gt} (%)
B300A-R	–	–	–	0.060	0.060	–	–	300	–	1.02	16	2
B300B-R										1.08		5
B300C-R										1.15		7
B300D-R	–	–	–	0.050	0.050	–	–	300	–	1.25	17	8
B300DWR	0.27	0.55	1.50	0.040	0.040	0.012	0.49	300–390				
B350DWR	0.27	0.55	1.60	0.040	0.040	0.012	0.51	350–455	–	1.25	17	8
B400A-R	–	–	–	0.060	0.060	–	–	400	–	1.02	14	2
B400B-R										1.08		5
B400C-R										1.15		7
B400D-R	0.29	0.55	1.60	0.040	0.040	–	0.55	400–520	–	1.25	17	8
B400AWR	0.22	0.60	1.60	0.050	0.050	0.012	0.50	400	–	1.02	14	2
B400BWR										1.08		5
B400CWR										1.15		7
B400DWR	0.29	0.55	1.80	0.040	0.040	0.012	0.56	400–520	–	1.25	17	8
B420DWR	0.30	0.55	1.50	0.040	0.040	0.012	0.56	420–546	–	1.25	16	8
B450AWR	0.22	–	–	0.050	0.050	0.012	0.50	450-562	–	1.05	–	2.5
B450CWR										1.15		7.5
B500A-R	–	–	–	0.060	0.060	–	–	500	–	1.02	14	2
B500B-R										1.08		5
B500C-R										1.15		7
B500D-R	0.32	0.55	1.80	0.040	0.040	–	0.60	500–625	–	1.25	13	8
B500AWR	0.22	0.60	1.60	0.050	0.050	0.012	0.50	500	–	1.02	14	2
B500BWR										1.08		5
B500CWR										1.15		7
B500DWR	0.32	0.55	1.80	0.040	0.040	0.012	0.61	500–650	–	1.25	13 [2]	8

[1] $CEV = \%C + \frac{\%Mn}{6} + \frac{\%Cr+\%Mo+\%V}{5} + \frac{\%Ni+\%Cu}{15}$

[2] Manufacturing standard elongation ≥14%.

3.3 American Standards

Standard	ASTM A615M -16	Issuing Country	United States of America

Grade	Chemical Composition (Maximum %)							Mechanical Properties (Minimum)				
	C	Si	Mn	P	S	N	CEV	Yield Strength (MPa)	Tensile Strength (MPa)	Tensile to Yield Ratio	El. (%) [1]	A_{gt} (%)
Grade 40	–	–	–	0.06	–	–	–	280	420	–	11–12	–
Grade 60								420	620		7–9	
Grade 75								520	690			
Grade 80								550	725		6–7	
Grade 100								690	790			

[1] Minimum elongation values depend on produced size.

Standard	ASTM A615M -18$^{\varepsilon 1}$	Issuing Country	United States of America

Grade	Chemical Composition (Maximum %)							Mechanical Properties (Minimum)				
	C	Si	Mn	P	S	N	CEV	Yield Strength (MPa)	Tensile Strength (MPa)	Tensile to Yield Ratio	El. (%) [1]	A_{gt} (%)
Grade 40	–	–	–	0.06	–	–	–	280	420	–	11–12	–
Grade 60								420	620		7–9	
Grade 80								550	725		6–7	
Grade 100								690	790			

[1] Minimum elongation values depend on produced size.

Standard	ASTM A706M -16	Issuing Country	United States of America

Grade [1]	Chemical Composition (Maximum %)							Mechanical Properties (Minimum)				
	C	Si	Mn	P	S	N	CEV [2]	Yield Strength (MPa)	Tensile Strength (MPa)	Tensile to Yield Ratio	El. (%) [3]	A_{gt} (%)
Grade 60	0.30	0.50	1.50	0.035	0.045	–	0.55	420–540	550	1.25	10–14	–
Grade 80								550–675	690		10–12	

[1] For concrete reinforcement intended for applications where restrictive mechanical properties and chemical composition are required for compatibility with controlled tensile property applications or to enhance weldability.

[2] $CEV = \%C + \frac{\%Mn}{6} + \frac{\%Cu}{40} + \frac{\%Ni}{20} + \frac{\%Cr}{10} + \frac{\%Mo}{50} + \frac{\%V}{10}$

[3] Minimum elongation values depend on produced size.

Standard	ASTM A510M -18	Issuing Country	United States of America	

Grade	Chemical Composition (%) [1]				
	C	Si [2]	Mn	P Max.	S Max.
AISI 1006	0.08 max.		0.25–0.45	0.040	0.050
AISI 1008	0.10 max.		0.30–0.50	0.040	0.050
AISI 1010	0.08–0.13		0.30–0.60	0.040	0.050
AISI 1012	0.10–0.15		0.30–0.60	0.040	0.050
AISI 1013	0.11–0.16		0.50–0.80	0.040	0.050
AISI 1015	0.13–0.18		0.30–0.60	0.040	0.050
AISI 1018	0.15–0.20		0.60–0.90	0.040	0.050
AISI 1022	0.18–0.23		0.70–1.00	0.040	0.050
AISI 1023	0.20–0.25		0.30–0.60	0.040	0.050
AISI 1025	0.22–0.28		0.30–0.60	0.040	0.050
AISI 1030	0.28–0.34		0.60–0.90	0.040	0.050
AISI 1037	0.32–0.38		0.70–1.00	0.040	0.050
AISI 1042	0.40–0.47		0.60–0.90	0.040	0.050
AISI 1045	0.43–0.50		0.60–0.90	0.040	0.050
AISI 1050	0.48–0.55		0.60–0.90	0.040	0.050
AISI 1055	0.50–0.60		0.60–0.90	0.040	0.050
AISI 1059	0.55–0.65		0.50–0.80	0.040	0.050
AISI 1060	0.55–0.65		0.60–0.90	0.040	0.050
AISI 1064	0.60–0.70		0.50–0.80	0.040	0.050
AISI 1065	0.60–0.70		0.60–0.90	0.040	0.050
AISI 1070	0.65–0.75		0.60–0.90	0.040	0.050

[1] If required, copper can be specified as 0.20% minimum.

[2] Where silicon is required, one of the following ranges and limits are commonly specified: (max 0.10%), (0.10–0.20%), (0.15–0.35%), (0.15–0.40%), or (0.20–0.40%).

3.4 British Standard

Standard	BS: 4449/2005 + A3:2016	Issuing Country	United Kingdom

Grade	Chemical Composition (Maximum %) [1]							Mechanical Properties (Minimum)				
	C	Si	Mn	P	S	N	CEV [2]	Yield Strength (MPa)	Tensile Strength (MPa)	Tensile to Yield Ratio	El. (%)	A_{gt} (%)
B500A	0.22	–	–	0.05	0.05	0.012	0.50	500–650	–	1.05[3]	–	2.5[4]
B500B										1.08	–	5.0
B500C										≥1.15, <1.35	–	7.5

[1] Maximum copper content = 0.80%.

[2] $CEV = \%C + \frac{\%Mn}{6} + \frac{\%Cr+\%Mo+\%V}{5} + \frac{\%Ni+\%Cu}{15}$

[3] For sizes below 8 mm, the tensile strength to yield strength ratio is 1.02.

[4] For sizes below 8 mm, A_{gt} is 1.0%.

3.5 French Standards

Standard	NF A 35-016: 1996	Issuing Country	France

Grade	Chemical Composition (Maximum %)							Mechanical Properties (Minimum)				
	C	Si	Mn	P	S	N	CEV [1]	Yield Strength (MPa)	Tensile Strength (MPa)	Tensile to Yield Ratio	El. (%)	A_{gt} (%)
FeE500-2	0.22	–	–	0.050	0.050	0.012	0.50	500	–	1.03	–	2.5
FeE500-3										1.08	–	5.0

[1] $CEV = \%C + \frac{\%Mn}{6} + \frac{\%Cr+\%Mo+\%V}{5} + \frac{\%Ni+\%Cu}{15}$

Standard	NF A 35-080-1: 2013	Issuing Country	France

Grade	Chemical Composition (Maximum %) [1]							Mechanical Properties (Minimum)				
	C	Si	Mn	P	S	N	CEV [2]	Yield Strength (MPa)	Tensile Strength (MPa)	Tensile to Yield Ratio	El. (%)	A_{gt} (%)
B500A	0.22	–	–	0.050	0.050	0.012	0.50	500–650	–	1.05	–	2.5
B500B										1.08		5.0
B450B								450–585	–	1.08	–	5.0
B450C								450–562	–	1.15–1.35	–	7.5

[1] Maximum copper content = 0.80%.

[2] $CEV = \%C + \frac{\%Mn}{6} + \frac{\%Cr+\%Mo+\%V}{5} + \frac{\%Ni+\%Cu}{15}$

3.6 Canadian Standard

Standard	CSA G30.18-09 (R2019)	Issuing Country	Canada

Grade	Chemical Composition (Maximum %)							Mechanical Properties (Minimum)				
	C	Si	Mn	P	S	N	CEV [1]	Yield Strength (MPa)	Tensile Strength (MPa)	Tensile to Yield Ratio	El. (%) [2]	A_{gt} (%)
400R	–	–	–	0.05	–	–	–	400	540	1.15	7–10	–
500R								500	675	1.15	6–9	–
400W	0.30	0.50	1.60	0.035	0.045	–	0.55	400–525	540	1.15	12–13	–
500W								500–625	625	1.15	10–12	–

[1] $CEV = \%C + \frac{\%Mn}{6} + \frac{\%Cu}{40} + \frac{\%Ni}{20} + \frac{\%Cr}{10} - \frac{\%Mo}{50} - \frac{\%V}{10}$

[2] Minimum elongation values depend on produced size.

3.7 Ukrainian Standard

Standard	DSTU 3760:2006	Issuing Country	Ukraine

Grade	Chemical Composition (Maximum %) [1]							Mechanical Properties (Minimum)				
	C	Si	Mn	P	S	N	CEV [2]	Yield Strength (MPa)	Tensile Strength (MPa)	Tensile to Yield Ratio	El. (%)	A_{gt} (%)
A400S	0.25	–	–	0.045	0.050	0.012	0.25–0.52	400	500	1.05	16	5
A500S							0.30–0.52	500	600	1.05	14	5

[1] Maximum arsenic content = 0.08%.

[2] $CEV = \%C + \frac{\%Mn}{6} + \frac{\%Cr+\%Mo+\%V}{5} + \frac{\%Ni+\%Cu}{15}$ or $CEV = \%C + \frac{\%Mn}{6} + \frac{\%Si}{10}$

4. PHYSICAL CHARACTERISTICS OF BUNDLES

4.1 Bar Weight per Unit Length

TABLE 2 – DIMENSIONS, WEIGHT PER UNIT LENGTH AND UNIT WEIGHT TOLERANCE

Diameter (mm) [1]	Nominal Unit Weight (kg/m) [2]	Manufacturing Steel Standard		
		Unit Weight Tolerance (%) [3]	Number of Bars/ Bundle	Maximum Bundle Weight (kg) [4]
10	0.617	94.5–97.5	270	1,949
12	0.888	94.5–97.5	188	1,953
14	1.210	95.5–98.0	138	1,964
16	1.580	95.5–98.0	105	1,951
18	2.000	95.5–98.0	83	1,952
20	2.470	95.5–98.0	67	1,946
22	2.980	95.5–98.0	56	1,963
25	3.850	96.5–98.5	43	1,957
28	4.840	96.5–98.5	34	1,945
32	6.310	96.5–98.5	26	1,939
40	9.860	96.5–98.5	17	1,981

[1] Any special size from Ø 10 mm to Ø 40 mm can be produced according to customer request.

[2] Unit weights are according to Egyptian and international standards.

[3] For more customer satisfaction; the typical unit weight for the local market is on the negative side of the Egyptian standard acceptable limits.

[4] Maximum Bundle Weight in case of standard bar length of 12 m.

4.2 Length, Weight and Packaging

Bar lengths from 6 m up to 24 m are producible. Bundle weight varies with the bar length as shown in Table 3.

TABLE 3 – PRODUCIBLE LENGTHS, BUNDLE WEIGHT AND PACKAGING

Ser.	Bundle Length (m) [1]	Maximum Bundle Weight (kg)	No. of Double Ties
1	6	991	4
2	10	1,651	5
3	12[2]	1,981	6
4	14	2,311	6
5	16	2,641	7
6	18	2,972	8
7	24	3,962	9

[1] Any special lengths from 6 up to 24 meter can be produced upon request.

[2] Standard length in the local Egyptian market.

SECTION 2: WIRE ROD

1. PRODUCED SIZES

The Factory produces wire rod from size Ø 5.5 mm to size Ø 16 mm as follows:

Diameter (mm)	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0
	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0
	13.5	14.0	14.5	15.0	15.5	16.0		

2. COIL WEIGHT

About 2.0 tons.

3. COIL DIMENSIONS

Inner diameter: 800–850 mm.
Outer diameter: 1,200–1,250 mm.
Coil height: 2,000 mm maximum (varies with produced size).

4. COIL PACKAGING

Compact packaging with 4 ties of 7 mm wire. Ties are single or double according to size, destination, and customer request. Bellyband is applied for export shipments.

5. APPLICATIONS

The Factory produces a range of low, medium and high carbon steel wire rod for industrial applications according to international standards.

5.1 Wire Rod for Welded Steel Fabric

Wire rod to be used for making cold-drawn concrete reinforcement bars and welded steel fabric.

5.2 Wire Rod for Welding Electrodes

Wire rod for producing welding electrodes according to DIN 8557 S2 or AISI 1008 with special silicon and manganese levels.

5.3 Wire Rod for Cable Armouring

Wire rod for cable armouring which is used in underground projects in order to protect the electric cables from mechanical damage.

5.4 Drawing-Grade Wire Rod

Wire rod to be used for drawing wires for various applications. Typical exemplary applications are listed in Table 1.

TABLE 1 – TYPICAL EXEMPLARY APPLICATIONS OF PRODUCED DRAWING-GRADE WIRE ROD

Grades	Representative Grades	Application
Low carbon	AISI (1006, 1008, 1010, 1012, 1013, 1015, 1018, 1020, 1022)	Barbed wire, nails, refrigerator condenser, refrigerator shelves, coated wires for fences, steel wool, galvanized drawn wire, cooker's pots holders.
Medium carbon	AISI (1025, 1030, 1037,1038, 1042, 1045)	Nails, bolts, galvanized drawn wire, spring fastening (mattress component).
High carbon	AISI (1050, 1055, 1059, 1060, 1064, 1065, 1070)	Mattress spring (upholstery), sling wire rope, galvanized drawn wire, electric cables reinforcing.

6. PRODUCIBLE STANDARDS

The Factory produces steel wire rod according to the international standards:

6.1 American Standard

ASTM A510M – 18

6.2 International/European Standard

EN ISO 16120-2:2017

6.3 Japanese Standard

JIS G 3507-1:2010

Other standards can be produced upon customer request. Please contact sales team for details.

6.1 American Standard

Standard	ASTM A510M -18	Issuing Country	United States of America

Grade [1, 2]	Chemical Composition (%) [3, 4]				
	C	Si [5]	Mn	P Max.	S Max.
AISI 1006	0.08 max.		0.25–0.45	0.040	0.050
AISI 1008	0.10 max.		0.30–0.50	0.040	0.050
AISI 1010	0.08–0.13		0.30–0.60	0.040	0.050
AISI 1012	0.10–0.15		0.30–0.60	0.040	0.050
AISI 1013	0.11–0.16		0.50–0.80	0.040	0.050
AISI 1015	0.13–0.18		0.30–0.60	0.040	0.050
AISI 1018	0.15–0.20		0.60–0.90	0.040	0.050
AISI 1022	0.18–0.23		0.70–1.00	0.040	0.050
AISI 1023	0.20–0.25		0.30–0.60	0.040	0.050
AISI 1025	0.22–0.28		0.30–0.60	0.040	0.050
AISI 1030	0.28–0.34		0.60–0.90	0.040	0.050
AISI 1037	0.32–0.38		0.70–1.00	0.040	0.050
AISI 1042	0.40–0.47		0.60–0.90	0.040	0.050
AISI 1045	0.43–0.50		0.60–0.90	0.040	0.050
AISI 1050	0.48–0.55		0.60–0.90	0.040	0.050
AISI 1055	0.50–0.60		0.60–0.90	0.040	0.050
AISI 1059	0.55–0.65		0.50–0.80	0.040	0.050
AISI 1060	0.55–0.65		0.60–0.90	0.040	0.050
AISI 1064	0.60–0.70		0.50–0.80	0.040	0.050
AISI 1065	0.60–0.70		0.60–0.90	0.040	0.050
AISI 1070	0.65–0.75		0.60–0.90	0.040	0.050

[1] AISI steel grades are used for industrial applications. Mechanical properties are to be agreed upon with the customer.

[2] Wire rod for producing welding electrodes can be produced according to DIN 8557 S2 or AISI 1008 with special silicon and manganese levels.

[3] If required, copper can be specified as 0.20% minimum.

[4] The chemical composition can be modified according to customers' needs and Factory Steel capabilities.

[5] Where silicon is required, one of the following ranges and limits are commonly specified: (max 0.10%), (0.10–0.20%), (0.15–0.35%), (0.15–0.40%) or (0.20–0.40%).

6.2 International/European Standard

Standard	EN ISO 16120-2:2017	Issuing Country	International/European

Grade	European Material No.	Chemical Composition (%) [1, 2, 3]							
		C	Si [4]	Mn	P max.	S max.	Cr max.	Ni max.	Cu [5] max.
C4D	1.0300	≤0.06	≤0.30	0.30–0.60	0.035	0.035	0.20	0.25	0.30
C7D	1.0313	0.05–0.09	≤0.30	0.30–0.60	0.035	0.035	0.20	0.25	0.30
C9D	1.0304	≤0.10	≤0.30	0.30–0.60	0.035	0.035	0.20	0.25	0.30
C10D	1.0310	0.08–0.13	≤0.30	0.30–0.60	0.035	0.035	0.20	0.25	0.30
C12D	1.0311	0.10–0.15	≤0.30	0.30–0.60	0.035	0.035	0.20	0.25	0.30
C15D	1.0413	0.12–0.17	≤0.30	0.30–0.60	0.035	0.035	0.20	0.25	0.30
C18D	1.0416	0.15–0.20	≤0.30	0.30–0.60	0.035	0.035	0.20	0.25	0.30
C20D	1.0414	0.18–0.23	≤0.30	0.30–0.60	0.035	0.035	0.20	0.25	0.30
C26D	1.0415	0.24–0.29	0.10–0.30	0.50–0.80	0.030	0.030	0.20	0.25	0.30
C32D	1.0530	0.30–0.35	0.10–0.30	0.50–0.80	0.030	0.030	0.20	0.25	0.30
C38D	1.0516	0.35–0.40	0.10–0.30	0.50–0.80	0.030	0.030	0.20	0.25	0.30
C42D	1.0541	0.40–0.45	0.10–0.30	0.50–0.80	0.030	0.030	0.20	0.25	0.30
C48D	1.0517	0.45–0.50	0.10–0.30	0.50–0.80	0.030	0.030	0.15	0.20	0.25
C50D	1.0586	0.48–0.53	0.10–0.30	0.50–0.80	0.030	0.030	0.15	0.20	0.25
C52D	1.0588	0.50–0.55	0.10–0.30	0.50–0.80	0.030	0.030	0.15	0.20	0.25
C56D	1.0518	0.53–0.58	0.10–0.30	0.50–0.80	0.030	0.030	0.15	0.20	0.25
C58D	1.0609	0.55–0.60	0.10–0.30	0.50–0.80	0.030	0.030	0.15	0.20	0.25
C60D	1.0610	0.58–0.63	0.10–0.30	0.50–0.80	0.030	0.030	0.15	0.20	0.25
C62D	1.0611	0.60–0.65	0.10–0.30	0.50–0.80	0.030	0.030	0.15	0.20	0.25
C66D	1.0612	0.63–0.68	0.10–0.30	0.50–0.80	0.030	0.030	0.15	0.20	0.25
C68D	1.0613	0.65–0.70	0.10–0.30	0.50–0.80	0.030	0.030	0.15	0.20	0.25
C70D	1.0615	0.68–0.73	0.10–0.30	0.50–0.80	0.030	0.030	0.15	0.20	0.25
C72D	1.0617	0.70–0.75	0.10–0.30	0.50–0.80	0.030	0.030	0.15	0.20	0.25

[1] Elements not included in this table may not be added intentionally to the steel without the agreement of the purchaser, except those intended for finishing the heat. By agreement at the time of ordering, the grades can contain additions (commonly termed micro-alloying additions) of Cr and V. The content of Cr is up to 0.30% and the content of V is 0.05% to 0.10%.

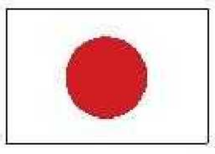
[2] %Mo (max.) = 0.05

[3] %Al (max.) = 0.01. By agreement at the time of ordering, the value for aluminium can be fixed at 0.01% to 0.06%. In such cases, the value of silicon can be fixed at ≤0.10% on request.

[4] For wire rod intended for galvanization, the required lower limit of silicon content should be specified at the time of ordering. By agreement at the time of ordering, the maximum silicon level for grades C4D to C20D may be further restricted.

[5] A maximum copper content of 0.20% may be agreed at the time of ordering. For steel grades C48D to C92D, Cu + Sn shall be ≤0.25%.

6.3 Japanese Standard

Standard	JIS G 3507-1:2010	Issuing Country	Japan	

Grade	Chemical Composition (%)							
	C	Si	Mn	P max.	S max.	Cr max.	Ni max.	Cu max.
SWRCH6R	≤0.08	–	≤0.6	0.040	0.040	0.20	0.20	0.30
SWRCH8R	≤0.10		≤0.6	0.040	0.040	0.20	0.20	0.30
SWRCH12R	0.10–0.15		0.30–0.60	0.040	0.040	0.20	0.20	0.30

DEDICATION TO INVESTING
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OUR PEOPLE, COUPLED
WITH A COMMITMENT TO
CONTINUOUS IMPROVEMENT
AND UNPARALLELED
CUSTOMER SERVICE.