

# GRADE-SECTION PRODUCTS ASSORTMENT EXPORT

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### 1. STEEL GRADES ANB DELIVERY STANDARDS

#### 1.1. CONSRUCTIONAL STEEL GRADES

#### CONSRUCTIONAL STEEL GRADES OF ORDINARY QUALITY, GENERAL USE

GERMANY	USA	RUSSIA ≈ ANALOGUE
S235JR (1.0038) S235 (1.0117)	1015	CT3CH, CT15
S275JR (1.0044)	≈1023	CT4CH, CT20
S355J2 (1.0577)	≈1030	20Г2
E335 (1.0060)	≈1042	CT5CH, CT30-35

#### CARBON CONSRUCTIONAL STEEL

GERMANY	USA	FRANCE	ITALIA	RUSSIA ANALOGUE GOST
C22E (1.1151)				
C22R (1.1149)	1020		C20	20
C30 (1.0528)	1030	XC32	C30	30
C35 (1.0501)				
C35E (1.1181) C35R (1.1180)	1035	XC38	C35	35
C40				
C40E (1.1186) C40R (1.1189)	1040	XC42	C40	40
C45				
C45E (1.1191)	1045	XC45	C45	45

C45R (1.1201)				
C50				
C50E (1.1206) C50R (1.1241)	1050	XC48	C50	50
C55 (1.0535)				
C55E (1.1203) C55R (1.1209)	1055	XC55	C55	55
C60				
C60E (1.1221) C60R (1.1223)	1060	XC60	C60	60

#### ALLOY HEAT TREATABLE CONSRUCTIONAL STEEL

GERMANY	USA	FRANCE	ITALIA	RUSSIA GOST ANALOGUE
41Cr4 (1.7035) 41CrS4 (1.7039)	5140	41Cr4	41Cr4	40X
25CrMo4 (1.7218)	4130	25CD4	25CrMo4	25XM
42CrMo4 (1.7225)	4140 4142	42CD4	42CrMo4	38XГM
30CrNiMo8 (1.6580)		30CND8	30CrNiMo8	30X2H2M
34CrMo4 (1.7220)	4135	35CD4	35CrMo4	35XM
39NiCrMo3 (1.6510)			39NiCrMo3	40XГHM
and other		35NCD16		30-35X2H4MA

#### CONSTRUCTIONAL CASE-HARDENED STEEL GRADES

GERMANY	FRANCE	ITALIA	USA	RUSSIA (GOST ANALOGUE)
C15E/Ck15 (1.1141)	XC 15-18		1015	15
16MnCr5 (1.7131)	16MC5	16MnCr5	5115	18XГ
20MnCr5 (1.7147)	20MC5	20MnCr5	5120	18XГ
15CrNi6 (1.5919)	16NC6		3115	14XГH
18CrNiMo7-6 (1.6587)	18NCD6	18NiCrMo7		20XH2M
16CrMo4		18CrMo4		20XM
		18NiCrMo5		20XГH2M
21NiCrMo2-2 (1.6523)	22NCD2	20NiCrMo2	SAE 8620	20XГHM
15CrMoV5-9 (1.8521)				15X1MΦA

#### KIND OF PRODUCTS

Bloom with cross-section of 160-250mm and square steel billet of 50-160mm (with /without heat treatment);

The bars of a diameter:

- 14-200mm with surface peeling (with/without heat treatment);
- 14-75mm without surface peeling (with/without heat treatment);
- bars with special surface finishing, dia. 2-120mm (ground, polished, with/without heat treatment);
- square steel billet, cross section of 50-120mm, suitable for the following heat treatment , including upsetting, forging, hot forming with/without heat treatment.

#### CHARACTERISTICS TO BE CONTROLLED (to be agreed when order is received):

- macrostructure
- ultrasonic test
- mechanical properties on the heat treated samples or in the delivery condition
- non-metallic inclusions
- grain size
- hardenability (+H); (HH) – according to the agreement
- non-mixed test
- hardness

**NOTES:**

the bars 14-200mm rd are to be produced with Ca, N, or S micro-alloying to improve the mechanical treatment;

the limited quantity of the bars can be delivered in the heat-treated condition (normalization, annealing, high-temperature tempering) of the length up to 8,5 m

**APPENDIXES****CONSTRUCTIONAL STEEL GRADES (STEELMAKING)**

- in the open electro-arc furnace
- with/or without LHF
- with/or without VOD
- vacuum-arc re-melting
- electro-slag re-melting

**STEEL HARDNESS IN THE DELIVERY CONDITION, WITHOUT HEAT TREATMENT** provided with working technology.

<b>Steel grade</b>	<b>Hardness in the delivery condition (max)</b>
XC18	195
S355J2	255
XC38	220
C45, CK45	240
XC48	245
16MnCr5(S)	210
20MnCr5	255
S235JR	255

**Note:** for hardness guaranteeing bars may be subject to annealing

**1.2. CORROSION-RESISTANT STEEL GRADES****MARTENSITIC-FERRITIC AND MARTENSITIC STEEL GRADES**

<b>GERMANY</b>	<b>USA</b>	<b>RUSSIA (GOST ANALOGUE)</b>
<b>X12Cr13 (1.4006)</b>	<b>410</b>	<b>12X13</b>
<b>X20Cr13 (1.4021)</b>	<b>420</b>	<b>20X13</b>
<b>X30Cr13 (1.4028)</b>	<b>420F</b>	<b>30X13</b>
<b>X17CrNi16.2 (1.4057)</b>	<b>431</b>	<b>20X17H2</b>

**KIND OF PRODUCTS:**

- Bloom of cross-section of 160-250mm and square steel billet of 50-160mm (with heat treatment);
- hot rolled peeled bars 14-200mm rd (annealed)
- hot rolled bars with special surface finishing of a dia.2-120mm as ground and polished (annealed).

**CHARACTERISTICS TO BE CONTROLLED** (to be agreed when order is received):

- macrostructure
- ultrasonic test
- mechanical properties in the delivery condition
- hardness, strength in the annealed condition
- hardness on the samples after upsetting (as required)
- impact test (as required)

## AUSTENITIC STEEL GRADES

GERMANY	USA	RUSSIA (GOST ANALOGUE)
X5CrNi18-10 (1.4301)	304	08X18H10
X6CrNiTi 18-10 (1.4541)	321	08X18H10T
X5CrNiMo 17-12-2 (1.4401)	316	06X17H13M2
X6CrNiMoTi 17-12-2 (1.4571)	316Ti	10X17H13M2T
X2CrNi 18-9 (1.4307)	304L	03X18H10
X2CrNiMo17-12-2 (1.4404)	316L	03X17H14M2

### KIND OF PRODUCTS:

Bloom of cross-section of 160-250mm and square steel billet of 50-160mm (without heat treatment);

Bars in a diameter:

-bars of 14-200mm with surface peeling;

-bars with special surface finishing of a dia.2-120mm as ground and polished.

### CHARACTERISTICS TO BE CONTROLLED (to be agreed when order is received):

- macrostructure
- ultrasonic test
- mechanical properties in the delivery condition
- non-metallic inclusions
- intergranular corrosion resistance
- the roughness of the surface Rz max 20mkm as per the customer's request

## 1.3. TOOL AND HIGH-SPEED STEEL GRADES

### STEEL GRADES AND STANDARDS FOR THE DELIVERY

GERMANY	USA	RUSSIA (GOST ANALOGUE)
X210CrW12 (1.2436)		X12BM
X210Cr12 (1.2080)	D3	X12
X153CrVMo12-1 (1.2379)	D2	X12MΦ
90MnCrV8 (1.2842)	02	9Г2Φ
X37CrMoV5-1 (1.2343)	H11	4X5MΦC
X37CrMoV5-1 EFS (1.2344EFS)		
32CrMoV12-28 (1.2365)	H10	3X3M3Φ
32CrMoV12-28EFS (1.2365EFS)		
55NiCrMoV7 (1.2714)	L6	5XHM
X38CrMoV5-3 (1.2367)		4X5M3Φ
X38CrMoV5-3 EFS (1.2367EFS)		
X40CrMoV5-1 (1.2344)	H13	4X5MΦ1C
X40CrMoV5-1 EFS (1.2344EFS)		
100MnCrW4 (1.2510)	01	9XBГ
100Cr6 (1.2067)	L3	X (ШХ15)
HS 6-5-2S (1.3343)	M2	P6M5
HS 6-5-2 (1.3243)		P6M5K5

Note: steel grades X37CrMoV5-1EFS (1.2343EFS); 32CrMoV12-28EFS (1.2365EFS); X38CrMoV5-3 EFS (1.2376EFS), X40CrMoV5-1 EFS (1.2344EFS) to be Ca-treated

### KIND OF PRODUCTS:

- round peeled bars of dia.14-200mm (annealed)

- bars with special surface finishing of a dia.2-120mm with special surface finishing as ground and polished (annealed)

- bars of a dia.14-60mm, hot rolled, peeled, ground: 1.2436, 1.2080, 1.2379 (annealed);

- bars of a dia. 14-60mm, hot rolled, ground, polished: 1.3343, 1.3243 (annealed);

**CHARACTERISTICS TO BE CONTROLLED** (to be agreed when order is received):

- macrostructure
- ultra sonic test
- hardness
- decarburizing layer
- carbide inhomogeneity as
- non-metallic inclusions (except of high-speed steels)

**2.SHAPES, DIMENSIONS, CROSS-SECTIONS, DEVIATIONS FOR SHAPES AND DIMENSIONS**

Kind of products	Dimension, mm	Length, m
Bloom	160-250	2-6
Square billet	50-120	1,5-3,5
	140-160	1,5-3,5
Round peeled bars DIN EN 10060	14-200	3-6
Round bars without peeling	14-75	4-6
Round bars with special surface finishing h10-h13 (ISO) as per agreement	2-3	1,5-2,0
	>3-9	1,9-3,5
	>9-50	1,9-6,0

**Note:** according to agreement the bars with special surface finishing, dia. 2-50mm can be delivered with max tolerances **j** (tolerances +/-) and **K** (tolerance +).

**Other delivery terms:**

The steel products can be delivered according to special Customer's requirements with preparing of the necessary technical documentation;

**3. SURFACE QUALITY OF STEEL PRODUCTS**

Kind of products	Surface defects	
	Non permissible	permissible
Bloom (160 – 250 mm) without surface conditioning	Rolling skin, laps, cracks, rough tears	isolated fine marks, roll marks, pitted surface, hair lines with the depth 8% max from nominal size
Square steel billet (50 – 160 MM), suitable for forging/closed die forging	Scab, rough tears, cracks, roll marks	Pitted surface, expanded blisters, dirty spots of the depth max 0,3mm calculating from the factual size

**Note:** the surface quality of the bars shall be specified when placing an order.