

FLAT ROLLED PRODUCTS FOR BOILERS AND HIGH-PRESSURE VESSELS

Under GOST 5520-79

Rolled stock produced under GOST 5520-79 is intended for welding and manufacture of components of high-pressure boilers and vessels operating at room/below room/above room temperature.

The aim and conditions of application of the rolled steel products intended for the units being supervised by the State Boiler Supervision Authority are regulated by the State Mining Machinery Supervision Authority's Code.

The flat rolled products are manufactured of carbon and low alloy steel within product ranges specified for rolling mills and are delivered as hot-rolled and heat-treated products.

Chemical composition

Steel Grade	Fraction of total mass, %				
	C	Si	Mn	S max	P max
20K	0.16-0.24	0.15-0.30	0.35-0.65	0.040	0.040
09G2S	Not more than 0.12	0.5-0.8	1.3-1.7	0.040	0.035
12HM	Not more than 0.16	0.17-0.37	0.4-0.7	0.025	0.025

Mechanical properties

Steel Grade	Thickness, mm	Yield strength, σ_T , N/cm ² (krf/mm ²), not less than	Ultimate strength, σ_B , N/cm ² (krf/mm ²), not less than	Relative elongation, $\delta_5^{\%}$, not less than	Impact toughness	
					J/cm ² (krf·m/cm ²), not less than	After mechanical ageing/cm ² (krf·m/cm ²)
20K	Up to 20 incl.	245 (25)	400-510 (41-52)	25	59 (6)	29 (3)
	Over 20 to 40 incl.	235 (24)	400-510 (41-52)	24	54 (5.5)	24 (2.5)
	Over 40 to 60 incl.	235 (24)	400-510 (41-52)	23	49 (5)	24 (2.5)
09G2S	5 to 10 incl.	345 (35)	490 (50)	21	64 (6.5)	29 (3.0)
	Over 10 to 20 incl.	325 (33)	470 (480)		59 (6.0)	29 (3.0)
	Over 20 to 32 incl.	305 (31)	460 (47)		59 (6.0)	29 (3.0)
	Over 32	285 (29)	450 (46)		59 (6.0)	29 (3.0)
12HM	4-50	245 (25)	431-538 (44-56)	22	59 (6.0)	-

Steel is to be in conformity with GOST 19903-74 as to dimensions, tolerances and other requirements.

Products for application in the Northern areas (KV-40o and KV-50o) are manufactured of steel grade 09G2S, which is characterized by limited sulphur, content, with subsequent hardening and tempering.

Referring to rated mechanical properties, steel is manufactured in conformity with any of the categories mentioned in the table below.

Rated characteristics	Category																					
	2*	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
Chemical composition	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Mechanical properties at tension and cold bending	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Impact viscosity KCU at +20oC	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Impact viscosity KCU after mechanical ageing	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Impact viscosity at temperature:																						
-20°C	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-40°C	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-50°C	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-60°C	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-70°C	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Impact viscosity KCU at temperatures:																						
+20°C and after mech.ageing	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-
-20°C and after mech. ageing	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
-40°C and after mech. ageing	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
-50°C and after mech. ageing	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
-60°C and after mech. ageing	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
-70°C and after mech/ ageing	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
Yield strength at elevated temperature*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	-	-	-	-	-
Yield strength at elevated temperature, impact viscosity at one of negative temperatures** and after mechanical ageing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-

*is valid for sheet thickness up to 12 mm

** test temperature is specified in the order

Under ASTM A414/A414M

This standard covers hot-rolled products of carbon steel intended for manufacture of high pressure vessels by welding or brazing. Welding and brazing techniques are very important and must be in conformity with commercial rates.

Range of products

Thickness , mm	Type of rolled product at width, mm	
	300 to 1200 incl.	Over 1200
1,5 to 4,5	Sheet	Sheet
4.5 to 6.0 incl.	Sheet	Coils only

Chemical composition

Steel Grade	Fraction of total mass, %				
	C max	Mn max	P max	S max	Cu min
A	0.15	0.90	0.035	0.035	0.20
B	0.22	0.90	0.035	0.035	0.20
C	0.25	0.90	0.035	0.035	0.20
D	0.25	1.20	0.035	0.035	0.20
E	0.27	1.20	0.035	0.035	0.20
F	0.31	1.20	0.035	0.035	0.20
G	0.31	1.35	0.035	0.035	0.20

Mechanical properties

Steel Grade	Yield strength, not less than		Ultimate strength, not less than	
	ksi	MPa	ksi	MPa
A	25	170	45	310
B	30	205	50	345
C	33	230	55	380
D	35	240	60	415
E	38	260	65	450
F	42	290	70	485
G	45	310	75	515

Under to ASTM A285/A285M

This standard covers rolled products of low-strength and medium-strength carbon steel. Steel can be killed, semi-killed, rimming or depending on the manufacturer's choice.

The rolled products are intended for manufacturing high-pressure vessels by welding method.

Production of 6.35 to 50.00 mm thick rolled products of steel grades A, C has been brought to a commercial level. Same is applicable to other steel grades, if agreed upon with a customer.

Under to ASTM A516/A516M

This standard covers hot-rolled plates of carbon steel.

The rolled products are intended for manufacturing high-pressure vessels used at moderate and low temperatures.

Production of steel grade 70 has been brought to a commercial level.

Under to JIS G3116

Rolled strips and sheets for gas cylinders. Production of steel grade SG255 has been brought to a commercial level.