

Table 1

Grade of steel			Fraction of total mass of element, %					
OKП code	Designation as per GOST 977	Designation as per CT CЭB	Carbon	Manganese	Silicon	Phosphor	Sulphur	Chromium
						Not more than		
Structured Non – alloy steel								
411200	15Л	$\frac{52731}{51731}$	0.12 – 0.20	0.45 – 0.90	0.20 – 0.52	As per table 4	As per table 4	-
	20Л	-	0.17 – 0.25	0.45 – 0.90	0.20 – 0.52	As per table 4	As per table 4	-
	25Л	$\frac{52821}{51821}$	0.22 – 0.30	0.45 – 0.90	0.20 – 0.52	As per table 4	As per table 4	-
	30Л	-	0.27 – 0.35	0.45 – 0.90	0.20 – 0.52	As per table 4	As per table 4	-
	35Л	$\frac{52831}{51831}$	0.32 – 0.40	0.45 – 0.90	0.20 – 0.52	As per table 4	As per table 4	-
	40Л	$\frac{52861}{51861}$	0.37 – 0.45	0.45 – 0.90	0.20 – 0.52	As per table 4	As per table 4	-
	45Л	$\frac{52862}{51862}$	0.42 – 0.50	0.45 – 0.90	0.20 – 0.52	As per table 4	As per table 4	-
	50Л	-	0.47 – 0.55	0.45 – 0.90	0.20 – 0.52	As per table 4	As per table 4	-
Structured Alloy Steel								
411220	20ГЛ	52763	0.15 - 0.25	1.20 – 1.60	0.20 – 0.40	0.040	0.040	-
	35ГЛ	52833	0.30 – 0.40	1.20 – 1.60	0.20 – 0.40	0.040	0.040	-
	20ГСЛ	-	0.16 – 0.22	1.00 – 1.30	0.60 – 0.80	0.030	0.030	-
	30ГСЛ	52834	0.25 – 0.35	1.10 – 1.40	0.60 – 0.80	0.040	0.040	-
	20Г1ФЛ	55244	0.16 – 0.25	0.90 – 1.40	0.20 – 0.50	0.050	0.050	-
	20ФЛ	55242	0.14 – 0.25	0.70 – 1.20	0.20 – 0.52	0.050	0.050	-
	30ХГСФЛ	55142	0.25 – 0.35	1.00 – 1.50	0.40 – 0.60	0.050	0.050	0.30 – 0.50
	45ФЛ	55243	0.42 – 0.50	0.40 – 0.90	0.20 – 0.52	As per table 4	As per table 4	-
	32Х06Л	-	0.25 – 0.35	0.40 – 0.90	0.20 – 0.40	0.050	0.050	0.50 – 0.80

Contd., Table 1

Grade of steel			Fraction of total mass of element, %					
OKП code	Designation as per GOST 977	Designation as per CT CЭB	Carbon	Manganese	Silicon	Phosphor	Sulphur	Chromium
						Not more than		
411220	40XЛ	55111	0.35 – 0.45	0.40 – 0.90	0.20 – 0.40	0.040	0.040	0.80 – 1.10
	20XMЛ	-	0.15 – 0.25	0.40 – 0.90	0.20 – 0.42	0.040	0.040	0.40 – 0.70
	20XMФЛ	-	0.18 – 0.25	0.60 – 0.90	0.20 – 0.40	0.025	0.025	0.90 – 1.20
	20ГНМФЛ	-	0.14 – 0.22	0.70 – 1.20	0.20 – 0.40	0.030	0.030	Not more than 0.30
	35XMЛ	55432	0.30 – 0.40	0.40 – 0.90	0.20 – 0.40	0.040	0.040	0.80 – 1.10
	30XНМЛ	55711	0.25 – 0.35	0.40 – 0.90	0.20 – 0.40	0.040	0.040	1.30 – 1.60
	35XГCЛ	55812	0.30 – 0.40	1.00 – 1.30	0.60 – 0.80	0.040	0.040	0.60 – 0.90
	35НГМЛ	-	0.32 – 0.42	0.80 – 1.20	0.20 – 0.40	0.040	0.040	-
	20ДХЛ	-	0.15 – 0.25	0.50 – 0.80	0.20 – 0.40	0.040	0.040	0.80 – 1.10
	08ГДНФЛ	55781	Not more than 0.10	0.60 – 1.00	1.15 – 0.40	0.035	0.035	-
	13XНДФТЛ	55782	Not more than 0.16	0.40 – 0.90	0.20 – 0.40	0.030	0.030	0.15 – 0.40
	12ДН2ФЛ	55783	0.08 – 0.16	0.40 – 0.90	0.20 – 0.40	0.035	0.035	-
	12ДХН1МФЛ	55761	0.10 – 0.18	0.30 – 0.55	0.20 – 0.40	0.030	0.030	1.20 – 1.70
	23XГC2МФЛ	55451	0.18 – 0.24	0.50 – 0.80	1.80 – 2.00	0.025	0.025	0.60 – 0.90
	12X7Г3CЛ	-	0.10 – 0.15	3.00 – 3.50	0.80 – 1.20	0.020	0.020	7.00 – 7.50
	25X2ГНМФЛ	-	0.22 – 0.30	0.70 – 1.10	0.30 – 0.70	0.025	0.025	1.40 – 2.00
	27X5ГCМЛ	-	0.24 – 0.28	0.90 – 1.20	0.90 – 1.20	0.020	0.020	5.00 – 5.50
	30X3C3ГМЛ	-	0.29 – 0.33	0.70 – 1.20	2.80 – 3.20	0.020	0.020	2.80 – 3.20
	03Н12Х5М3ТЛ	-	0.01 – 0.04	Not more than 0.20	Not more than 0.20	0.015	0.015	4.50 – 5.00
	03Н12Х5М3ТЮЛ	-	0.01 – 0.04	Not more than 0.20	Not more than 0.20	0.015	0.015	4.50 – 5.00

Contd., Table 1

Grade of steel			Fraction of total mass of element, %						
ОКП code	Designation as per GOST 977	Designation as per СТ СЭВ	Nickel	Molybdenum	Vanadium	Copper	Titanium	Boron	Aluminum
411220	40ХЛ	55111	-	-	-	-	-	-	-
	20ХМЛ	-	-	0.40 – 0.60	-	-	-	-	-
	20ХМФЛ	-	-	0.50 – 0.70	0.20 – 0.30	-	-	-	-
	20ГНМФЛ	-	0.70 – 1.00	0.15 – 0.25	0.06 – 0.12	-	-	-	-
	35ХМЛ	55432	-	0.20 – 0.30	-	-	-	-	-
	30ХНМЛ	55711	1.30 – 1.60	0.20 – 0.30	-	-	-	-	-
	35ХГСЛ	55812	-	-	-	-	-	-	-
	35НГМЛ	-	0.80 – 1.20	0.15 – 0.25	-	-	-	-	-
	20ДХЛ	-	-	-	-	1.40 – 1.60	-	-	-
	08ГДНФЛ	55781	1.15 – 1.55	-	As per calculation 0.10	0.80 – 1.20	-	-	-
	13ХНДФТЛ	55782	1.20 – 1.60	-	0.06 – 0.12	0.65 – 0.90	0.04 – 0.10	-	-
	12ДН2ФЛ	55783	1.80 – 2.20	-	0.08 – 0.15	1.20 – 1.50	-	-	-
	12ДХН1МФЛ	55761	1.40 – 1.80	0.20 – 0.30	0.08 – 0.15	0.40 – 0.65	-	-	-
	23ХГС2МФЛ	55451	-	0.25 – 0.30	0.10 – 0.15	-	-	-	-
	12Х7Г3СЛ	-	-	-	-	-	-	-	-
	25Х2ГНМФЛ	-	0.30 – 0.90	0.20 – 0.50	0.04 – 0.20	-	-	-	-
	27Х5ГСМЛ	-	-	0.55 – 0.60	-	-	-	-	-
	30Х3С3ГМЛ	-	-	0.50 – 0.60	-	-	-	-	-
	03Н12Х5М3ТЛ	-	12.00 – 12.50	2.50 – 3.00	-	-	0.70 – 0.90	-	-
	03Н12Х5М3ТЮЛ	-	12.00 – 12.50	2.50 – 3.00	-	-	0.70 – 0.90	-	0.25 – 0.45

Contd., Table 1

Grade of steel			Fraction of total mass of element %					
OKPcode	Designation as per GOST 977	Designation as per CT CЭB	Carbon	Manganese	Silicon	Phosphor	Sulphur	Chromium
						Maximum		
Structural alloy steel, used in CMEA countries								
411220	15ГЛ	52711	0.12 – 0.18	0.70 – 1.00	0.30 – 0.60	0.040	0.040	-
	30ГЛ	52832	0.25 – 0.32	1.40 – 1.70	0.20 – 0.50	0.040	0.040	-
	45ГЛ	52864	0.40 – 0.50	0.80 – 1.20	0.20 - 0.50	0.040	0.040	-
	70ГЛ	51931	0.65 – 0.80	1.10 – 1.60	0.20 - 0.50	0.045	0.045	-
	55СЛ	51891	0.52 - 0.60	0.50 - 0.80	0.50 - 0.70	0.045	0.045	-
	40Г1.5ФЛ	55241	0.35 – 0.45	1.60 - 1.90	0.20 - 0.50	0.040	0.040	-
	15ХЛ	55115	0.12 – 0.18	0.40 - 0.60	0.20 - 0.50	0.040	0.040	0.50 - 0.80
	30ХЛ	55116	0.25 – 0.35	0.50 - 0.90	0.20 - 0.50	0.040	0.040	0.50 - 0.80
	25ХГЛ	55117	0.20 – 0.30	0.85 - 1.15	0.20 - 0.50	0.040	0.040	0.90 - 1.30
	35ХГЛ	55118	0.30 – 0.45	0.60 - 0.90	0.50 - 0.75	0.040	0.040	0.50 - 0.80
	50ХГЛ	55114	0.45 – 0.60	0.50 - 0.90	0.20 - 0.50	0.040	0.040	0.60 - 0.90
	60ХГЛ	55112	0.50 – 0.65	0.90 - 1.30	0.20 - 0.50	0.050	0.050	0.90 - 1.30
	70Х2ГЛ	55113	0.60 – 0.75	0.80 - 1.20	0.20 - 0.50	0.050	0.050	1.80 - 2.20
	35ХГФЛ	55141	0.28 – 0.38	1.00 - 1.40	0.20 - 0.50	0.040	0.040	0.20 - 0.60
	40ХФЛ	55181	0.35 – 0.45	0.50 - 0.80	0.20 - 0.50	0.040	0.040	1.00 - 1.40
	30ХМЛ	55433	0.25 – 0.35	0.50 - 0.80	0.20 - 0.50	0.040	0.040	0.80 - 1.20
	40ХМЛ	55434	0.38 – 0.45	0.50 - 0.80	0.20 - 0.50	0.040	0.040	0.80 - 1.20
	40ХНЛ	55811	0.35 – 0.45	0.40 - 0.90	0.20 - 0.50	0.040	0.040	0.50 - 0.80
	40ХН2Л	55813	0.35 – 0.45	0.60 - 0.90	0.20 - 0.50	0.045	0.045	0.40 - 0.70
	30ХГ1.5МФЛ	55471	0.25 – 0.32	1.40 - 1.80	0.40 - 0.60	0.030	0.025	0.50 - 1.00

Contd., Table 1

Grade of steel			Fraction of total mass of element %						
OKП code	Designation as per GOST 977	Designation as per СТ СЭВ	Nickel	Molybdenum	Vanadium	Copper	Titanium	Boron	Aluminum
Structural alloy steel, used in CMEA countries									
411220	15ГЛ	52711	-	-	-	-	-	-	-
	30ГЛ	52832	-	-	-	-	-	-	-
	45ГЛ	52864	-	-	-	-	-	-	-
	70ГЛ	51931	-	-	-	-	-	-	-
	55СЛ	51891	-	-	-	-	-	-	-
	40Г1.5ФЛ	55241	-	-	0.10 – 0.20	-	-	-	-
	15ХЛ	55115	-	-	-	-	-	-	-
	30ХЛ	55116	-	-	-	-	-	-	-
	25ХГЛ	55117	-	-	-	-	-	-	-
	35ХГЛ	55118	-	-	-	-	-	-	-
	50ХГЛ	55114	-	-	-	-	-	-	-
	60ХГЛ	55112	-	-	-	-	-	-	-
	70Х2ГЛ	55113	-	-	-	-	-	-	-
	35ХГФЛ	55141	-	-	0.10 – 0.25	-	-	-	-
	40ХФЛ	55181	-	-	0.15 – 0.30	-	-	-	-
	30ХМЛ	55433	-	0.20 – 0.30	-	-	-	-	-
	40ХМЛ	55434	-	0.20 – 0.30	-	-	-	-	-
	40ХНЛ	55811	1.00 - 1.50	-	-	-	-	-	-
40ХН2Л	55813	1.60 – 2.00	-	-	-	-	-	-	
30ХГ1.5МФРЛ	55471	-	0.40 – 0.60	0.20 – 0.40	-	-	0.006 - 0.010	-	

Contd., table 1

Grade of steel			Fraction of total mass of element %					
OKП code	Designation as per GOST 977	Designation as per СТ СЭВ	Carbon	Manganese	Silicon	Phosphorous	Sulphur	Chromium
						Maximum		
411220	75ХНМФЛ	55762	0.70 – 0.85	0.60 – 0.90	0.20 – 0.50	0.050	0.050	1.30 – 1.70
	40ГТЛ	55771	0.34 – 0.42	1.20 – 1.60	0.20 – 0.50	0.045	0.045	-
	20ГНМЮЛ	55772	0.16 – 0.23	1.10 – 1.60	0.20 – 0.50	0.035	0.035	-

Contd., table 1

Grade of steel			Fraction of total mass of component %						
OKП code	Designation as per GOST 977	Designation as per СТ СЭВ	Nickel	Molybdenum	Vanadium	Copper	Titanium	Boron	Aluminum
411220	75ХНМФЛ	55762	0.50 – 0.80	0.40 – 0.60	0.10 – 0.25	-	-	-	-
	40ГТЛ	55771	-	-	-	-	0.02 – 0.10	-	-
	20ГНМЮЛ	55772	0.30 – 0.50	0.15 – 0.30	-	-	-	-	Not less than 0.01

Note:

1. The permissible contents and necessity of checking of presence of components, which are not alloys, is specified in КД (DESIGN DOCUMENT) and (or) НТД (standard technical document).
2. As per the requirements of user, the contents of sulphur and phosphorous in alloy structural steels may be placed not more than 0.030%.
3. During smelting of alloy steel in furnaces with acid lining, the permissible fraction of total mass of sulphur and phosphorous may be increased upto 0.010% for each, provided, the specifications of the remaining requirements of the present standard are ensured.
4. For steel grade 40ХНЛ, introduction of titanium is permissible upto 0.15% with the aim of increasing its mechanical properties.
5. For steel grades 15Л, 25Л, 35Л, 40Л, 45Л designation are given as per СТ СЭВ 4559-84 and for other steels – as per СТ СЭВ 4561-84.

Class of steel	OKII code	Grade of steel		Fraction of total mass				
		Designation as per GOST 977	Designation as per CT СЭБ 4563-84	Carbon	Silicon	Manganese	Chromium	Nickel
Alloy steels								
Martensite	411240	20X13Л	58113	0.16 - 0.25	0.20- 0.80	0.30 - 0.80	12.0 – 14.0	-
		08X14HДЛ	-	Max. 0.08	Max. 0.40	0.50 – 0.80	13.0 - 14.5	1.20 – 1.60
		09X16H4БЛ	-	0.05 – 0.13	0.20 – 0.60	0.30 – 0.60	15.0 – 17.0	3.50 – 4.50
		09X17H3СЛ	-	0.05 – 0.12	0.80 – 1.50	0.30 – 0.80	15.0 – 18.0	2.80 – 3.80
		20X5МЛ	-	0.15 - 0.25	0.35– 0.70	0.40 – 0.60	4.0 - 6.5	-
		20X8ВЛ	-	0.15 - 0.25	0.30 – 0.60	0.30 – 0.50	7.5 – 9.0	-
		40X9C2Л	-	0.35 - 0.50	2.00 – 3.00	0.30 – 0.70	8.0 – 10.0	-
		20X12ВНМФЛ	-	0.17 – 0.23	0.20 – 0.60	0.50 – 0.90	10.5 – 12.5	0.50 – 0.90
		10X12HДЛ	-	Max. 0.10	0.17 – 0.40	0.20 – 0.60	12.0 – 13.0	1.00 – 1.50
Martensite – Ferrite	411240	15X13Л	58112	Max. 0.15	0.20 – 0.80	0.30 – 0.80	12.0 – 14.0	-
Ferrite	411240	15X25ТЛ	-	0.10 – 0.20	0.50 – 1.20	0.50 – 1.80	23.0 – 27.0	-
Austenite – martensite	411240	08X15H4ДМЛ	-	Max. 0.08	Max. 0.40	1.00 – 1.50	14.0 – 16.0	3.50 – 3.90
		08X14H7МЛ	-	Max. 0.08	0.20 – 0.75	0.30 – 0.90	13.0 – 15.0	6.00- 8.50
		14X18H4Г4Л	-	Max. 0.14	0.20 – 1.00	4.00 – 5.00	16.0 – 20.0	4.00- 5.00

Table – 2

of element %											
Molybdenum	Vanadium	Tungsten	Titanium	Niobium	Boron	Nitrogen	Aluminum	Copper	Cerium	Sulphur	Phosphorous
										Maximum	
with special properties											
-	-	-	-	-	-	-	-	-	-	0.025	0.030
-	-	-	-	-	-	-	-	0.80-1.20	-	0.025	0.025
-	-	-	-	0.05-0.20	-	-	-	-	-	0.025	0.030
-	-	-	-	-	-	-	-	-	-	0.030	0.035
0.40-0.65	-	-	-	-	-	-	-	-	-	0.040	0.040
-	-	1.25-1.75	-	-	-	-	-	-	-	0.035	0.040
-	-	-	-	-	-	-	-	-	-	0.030	0.035
0.50-0.70	0.15-0.30	0.70-1.10	-	-	-	-	-	-	-	0.025	0.030
-	-	-	-	-	-	-	-	0.80-1.10	-	0.025	0.025
-	-	-	-	-	-	-	-	-	-	0.025	0.030
-	-	-	0.40-0.80	-	-	-	-	-	-	0.030	0.035
0.30-0.45	-	-	-	-	-	-	-	1.00-1.40	-	0.025	0.025
0.50-1.00	-	-	-	-	-	-	-	-	-	0.030	0.030
-	-	-	-	-	-	-	-	-	-	0.030	0.035

Class of steel	OKП code	Grade of steel		Fraction of total mass				
		Designation as per GOST 977	Designation as per CT CЭB 4563-84	Carbon	Silicon	Manganese	Chromium	Nickel
Austenite - Ferrite	411240	12X25H5TMΦЛ	-	Max., 0.12	0.20 – 1.00	0.30 – 0.80	23.5 – 26.0	5.00 – 6.50
		16X18H12C4TЮЛ	-	0.13 – 0.19	3.80 – 4.50	0.50 – 1.00	17.0 – 19.0	11.00 – 13.00
		35X23H7CЛ	-	Max., 0.35	0.50 – 1.20	0.50 – 0.85	21.0 – 25.0	6.00 – 8.00
		40X24H12CЛ	-	Max., 0.40	0.50 – 1.50	0.30 – 0.80	22.0 – 26.0	11.00 – 13.00
		20X20H14C2Л	-	Max., 0.20	2.00 – 3.00	Max., 1.50	19.0 – 22.0	12.00 – 15.00
		10X18H3Г3Д2Л	-	Max., 0.10	Max., 0.60	2.30 – 3.00	13.0 – 19.0	3.00 – 3.50
Austenite	411240	10X18H9Л	58762 58511	Max., 0.14	0.20 – 1.00	1.00 – 2.00	17.0 – 20.0	8.00 – 11.00
		12X18H9ТЛ	58561	Max., 0.12	0.20 – 1.00	1.00 – 2.00	17.0 – 20.0	8.00 – 11.00
		10X18H11БЛ	-	Max., 0.10	0.20 – 1.00	1.00 – 2.00	17.0 – 20.0	8.00 – 12.00
		07X17H16ТЛ	-	0.04 – 0.10	0.20 – 0.60	1.00 – 2.00	16.0 – 18.0	15.00 – 17.00
		12X18H12M3ТЛ	-	Max., 0.12	0.20 – 1.00	1.00 – 2.00	16.0 – 19.0	11.00 – 13.00
		55X18Г14C2ТЛ	-	0.45 – 0.65	1.50 – 2.50	12.00 – 16.00	16.0- 19.0	-
		15X23H18Л	-	0.10 – 0.20	0.20 – 1.00	1.00 – 2.00	22.0 – 25.0	17.00 – 20.00
		20X25H19C2Л	-	Max., 0.20	2.00- 3.00	0.50 1.50	23.0- 27.0	18.00- 20.00
		18X25H19CЛ	-	Max., 0.18	0.80 – 2.00	0.70 – 1.50	22.0 – 26.0	17.00 – 21.00
		45X17Г13H3ЮЛ	-	0.40 – 0.50	0.80 – 1.50	12.00 – 15.00	16.0 – 18.0	2.50 – 3.50

Contd., Table 2

of element %											
Molybdenum	Vanadium	Tungsten	Titanium	Niobium	Boron	Nitrogen	Aluminum	Copper	Cerium	Sulphur	Phosphorous
										Maximum	
0.06 - 0.12	0.07- 0.15	-	0.08- 0.20	-	-	0.08- 0.20	-	-	-	0.030	0.030
-	-	-	0.40- 0.70	-	-	-	0.13- 0.35	-	-	0.030	0.030
-	-	-	-	-	-	-	-	-	-	0.035	0.035
-	-	-	-	-	-	-	-	-	-	0.030	0.035
-	-	-	-	-	-	-	-	-	-	0.025	0.035
-	-	-	-	-	-	-	-	1.80- 2.20	-	0.030	0.030
-	-	-	-	-	-	-	-	-	-	0.030	0.035
-	-	-	From (5xC) to 0.70	-	-	-	-	-	-	0.030	0.035
-	-	-	-	0.45- 0.90	-	-	-	-	-	0.030	0.035
-	-	-	0.005- 0.150	-	-	-	-	-	-	-	0.035
3.00- 4.00	-	-	from (5xC) to 0.70	-	-	-	-	-	-	0.030	0.035
-	-	-	0.10 – 0.30	-	-	-	-	-	-	0.030	0.040
-	-	-	-	-	-	-	-	-	-	0.030	0.030
-	-	-	-	-	-	-	-	-	-	0.030	0.035
-	-	-	-	-	-	-	-	-	-	0.030	0.035
-	-	-	-	-	-	-	0.60- 1.00	-	-	0.030	0.035

Class of steel	OKП code	Grade of steel		Fraction of total mass				
		Designation as per GOST 977	Designation as per CT CЭB 4563-84	Carbon	Silicon	Manganese	Chromium	Nickel
Austenite	411240	35X18H24C2Л	-	0.30 – 0.40	2.00 – 3.00	Max., 1.50	17.0 – 20.00	23.00 – 25.00
		31X19H9MBБТЛ	-	0.26 – 0.35	Max., 0.80	0.80 – 1.50	18.0 – 20.0	8.00 – 10.00
		12X18H12БЛ	-	Max., 0.12	Max., 0.55	0.50 – 1.00	17.0 – 19.0	11.0 – 13.00
		08X17H34B5T3Ю2PЛ	-	Max., 0.08	0.20 – 0.50	0.30 – 0.60	15.0 – 18.0	32.00 – 35.00
		15X18H22B6M2PЛ	-	0.10 – 0.20	0.20 – 0.60	0.30 – 0.60	16.0 – 18.0	20.00 – 24.00
		20X21H46B8PЛ	-	0.10 – 0.25	0.20 – 0.80	0.30 – 0.80	19.0 – 22.0	43.00 – 48.00
	411250	110Г13Л	-	0.90 – 1.50	0.30 – 1.00	11.50 – 15.00	Max., 1.0	Max., 1.00
		110Г13Х2БРЛ	-	0.90 – 1.50	0.30 – 1.00	11.50 – 14.50	1.0 – 2.0	Max., 0.50
		110Г13ФТЛ	-	0.90 – 1.30	0.40 – 0.90	11.50 – 14.50	-	-
		130Г14ХМФАЛ	-	1.20 – 1.40	Max., 0.60	12.50 – 15.00	1.0 – 1.5	Max., 1.00
120Г10ФЛ		-	0.90 – 1.40	0.20 – 0.90	8.50 – 12.00	Max., 1.0	Max., 1.00	
Martensite	411260	85X4M5Φ2B6Л (P6M5Л)	-	0.82 – 0.90	Max., 0.50	Max., 0.50	3.8 – 4.4	Max., 0.40
		90X4M4Φ2B6Л (P6M4Φ2Л)	-	0.85 – 0.95	0.20 – 0.40	0.40 – 0.70	3.0 – 4.0	-
Alloy steel with special properties used								
Martensite-ferrite	411240	15X14НЛ	58411	Max 0.15	Max 0.60	0.40-0.90	12,0-15,0	0,70-1,20

Contd., Table 2

of element %											
Molybdenum	Vanadium	Tungsten	Titanium	Niobium	Boron	Nitrogen	Aluminum	Copper	Cerium	Sulphur	Phosphorous
										Maximum	
-	-	-	-	-	-	-	-	-	-	0.030	0.035
1.00-1.50	-	1.00-1.50	0.20-0.50	0.20-0.50	-	-	-	-	-	0.020	0.035
-	-	-	-	0.70-1.10	-	-	-	-	-	0.025	0.020
-	-	4.50-5.50	2.60-3.20	-	Max. 0.05	-	1.70-2.10	-	Max 0.01	0.010	0.010
2.00-3.00	-	5.00-7.00	-	-	Max, 0.01	-	-	-	-	0.030	0.035
-	-	7.00-9.00	-	-	Max, 0.06	-	-	-	-	0.035	0.040
-	-	-	-	-	-	-	-	-	-	0.050	0.120
-	-	-	-	0.08-0.12	0.001-0.006	-	-	-	-	0.050	0.120
-	0.10-0.30	-	0.01-0.05	-	-	-	-	-	-	0.050	0.120
0.20-0.30	0.08-0.12	-	-	-	-	0.025-0.050	-	-	-	0.050	0.070
-	0.03-0.12	-	Max. 0.15	Max. 0.01	-	Max, 0.03	-	Max, 0.7	-	0.050	0.120
4.80-5.30	1.70-2.10	5.50-6.50	-	-	-	-	-	-	-	0.025	0.030
3.00-4.00	2.00-2.60	5.00-7.00	-	-	-	-	-	-	-	0.040	0.040
in the contract of council for mutual economic assistance countries (CЭB)											
-	-	-	-	-	-	-	-	-	-	0.035	0.035

Class of steel	OKП Code	Grade of steel		Fraction of total mass				
		Designation as per GOST 977	Designation as per CT CЭB 4563-84	Carbon	Silicon	Manganese	Chromium	Nickel
Martensite - ferrite	411240	08X12H4ГCМЛ	58711	Max 0.08	Max 1.00	Max 1.50	11.5- 13.5	3.50- 5.00
Austenite - ferrite	411240	12X21H5Г2CЛ	58451	Max 0.12	Max 1.50	Max 2.00	20.0- 22.0	4.50- 6.00
		12X21H5Г2CTЛ	58461	Max 0.12	Max 1.50	Max 2.00	20.0- 22.0	4.50- 6.00
		12X21H5Г2CM2Л	58761	Max 0.12	Max 1.50	Max 2.00	20.0- 22.0	4.50- 6.00
		12X19H7Г2CAЛ	58462	Max 0.12	Max 1.50	Max 2.00	18.0- 20.0	6.00- 8.00
		12X21H5Г2CAЛ	58463	Max 0.12	Max 1.50	Max 2.00	20.0- 22.0	4.00- 6.00
		07X18H10Г2C2M2Л	58763	Max 0.07	Max 2.00	Max 2.00	17.0- 19.0	9.00- 12.00
		15X18H10Г2C2M2Л	58764	Max 0.15	Max 2.00	Max 2.00	17.0- 19.0	9.00- 12.00
		15X18H10Г2C2M2TЛ	58765	Max 0.15	Max 2.00	Max 2.00	17.0- 19.0	9.00- 12.00

Note:

1. The presence of components, which are not alloy, their permissible content, and necessity
2. In the steel grade 20X5MЛ molybdenum may be replaced by titanium in the quantity of not
3. In the steel grade 10X18H9Л for necessity of ensuring greater resistance against inter
4. In steel grade 20X13Л, during smelting in induction furnace increase of fraction of total mass
5. In steel grade 12X18H12БЛ, Fraction of total mass of phosphor should not be more than
6. In steel grade 12X21H5Г2CTЛ and 15X18H10Г2C2M2TЛ, use of niobium with titanium
7. In steel grades 08X17H34B5T3Ю2ПЛ, 15X18H22B6M2ПЛ, 20X21H46B8ПЛ contents and document (HTЛ)

Table – 2

of element %											
Molybdenum	Vanadium	Tungsten	Titanium	Niobium	Boron	Nitrogen	Aluminum	Copper	Cerium	Sulphur	Phosphorous
										Maximum	
Max 1.00	-	-	-	-	-	-	-	-	-	0.035	0.035
-	-	-	-	-	-	-	-	-	-	0.035	0.045
-	-	-	From (4XC) to 0.70	-	-	-	-	-	-	0.035	0.045
1.80- 2.20	-	-	-	-	-	-	-	-	-	0.035	0.045
-	-	-	-	-	-	0.10– 0.20	-	-	-	0.040	0.040
-	-	-	-	-	-	0.10– 0.20	-	-	-	0.040	0.040
2.00- 2.50	-	-	-	-	-	-	-	-	-	0.040	0.040
2.00- 2.50	-	-	-	-	-	-	-	-	-	0.040	0.040
2.00- 2.50	-	-	From 5XX C-0.03) to 0.80	-	-	-	-	-	-	0.040	0.040

of checking is specified in design document (КД) and (or) standard technical document (СТД).

more than 0.1% during working condition of parts at temperature of not more than 425⁰ C.

crystalline corrosion, carbon contents may be placed not more than 0.07%.

of sulphur upto 0.030% is permissible.

0.040%.

in quantity from (8XC) upto 1.20% is permissible for stabilization instead of titanium.

necessity of checking of cerium and boron is given in design documents (КД) and standard technical

Example of conventional designation of steels

25Л GOST 977 – 88
23ХГС2МФЛ GOST 977 – 88
20Х25Н19С2Л. GOST 977 – 88

Example of conventional designation of steels for casting meant for articles, subject to acceptance by customer representative.

25Л К20 GOST 977 – 88
23ХГС2МФЛ КТ 110 GOST 977 – 88

In the grade designation of steel, the first number indicates average or maximum (during absence of lower limit) fraction of total mass of carbon in hundred fraction of percent (%); letter with digits denotes: А – nitrogen, Б – niobium, В – Tungsten, Г – manganese, Д – Copper, М – molybdenum, Н – nickel, Р – boron, С – silicon, Т – titanium, Ф – Vanadium, Х - chromium, Ю – aluminum, Л – casting. The number, which appears after the letters indicates the approximate mass fraction of total mass of alloy element, in %.

Indexes «К» and «КТ» is the conventional designation of strength category, and the following number indicates the value of required yield point. Index «К» indicates material in annealed, normalized or tempered condition; index «КТ» - afterhardening and tempering.

1.4 The permissible deviation of alloy elements from the normal chemical composition is given in table 1, the value indicated in table 3 should not be exceeded.

Table 3

Chemical component	Fraction of total mass of element, %	Permissible deviation, in %	
		For lower content limit	For higher content limit
Carbon	Upto 0.25	- 0.02	+ 0.01
	Above 0.25 upto 0.50	- 0.03	+ 0.02
	Above 0.50	- 0.04	+ 0.03
Silicon	Upto 0.50	- 0.05	+ 0.01
	Above 0.50 upto 0.90	- 0.08	+ 0.15
	Above 0.90 upto 1.30	- 0.15	+ 0.20
	Above 1.30	- 0.15	+ 0.25
Manganese	Upto 0.50	- 0.07	+ 0.10
	Above 0.50 upto 0.90	- 0.10	+ 0.18
	Above 0.90	- 0.12	+ 0.25

Contd., Table 3

Chemical component	Fraction of total mass component %	Permissible deviation in, %	
		For lower content limit	For higher content limit
Chromium	Upto 1.00	- 0.07	+ 0.10
	Above 1.00 upto 2.00	- 0.10	+ 0.15
	Above 2.00	- 0.15	+ 0.20
Nickel	Up to 1.00	- 0.10	+ 0.15
	Above 1.00 upto 2.00	- 0.15	+ 0.20
	Above 2.00	- 0.20	+ 0.25
Molybdenum	Upto 0.20	- 0.03	+ 0.03
	Above 0.20	- 0.05	+ 0.05
Vanadium	Upto 0.20	- 0.03	+ 0.03
	Above 0.20	- 0.05	+ 0.05
Copper	For all contents of component	- 0.10	+ 0.10
Titanium	For all contents of component	- 0.02	+ 0.02
Aluminum	For all contents of component	- 0.01	+ 0.01

Fraction of total mass of sulphur and phosphorous in the structural non-alloy steel upto 01.01.92 should be in accordance with the requirements indicated in table 4, from 01.01.92 – as indicated in table 4 a.

Table 4

Casting group	Fraction of total mass of impurities, % maximum in steel					
	Basic	Acid	Conversion	Basic	Acid	Conversion
	Sulphur			Phosphorous		
1	0.050	0.060	0.060	0.050	0.060	0.080
2	0.045	0.060	0.050	0.040	0.060	0.070
3	0.045	0.050	-	0.040	0.050	-

Note: As per the requirement of the customer, the contents of sulphur in steels of grade 15Л, 25Л, 35Л, 40Л, 45Л and 45ФЛ should not be more than 0.040%.

Table 4a

Casting group	Fraction of total mass of impurities, % maximum in steel					
	Basic	Acid	Martin bare	Basic	Acid	Martin bare
	Sulphur			Phosphorous		
1	0.040	0.060	0.050	0.040	0.060	0.050
2	0.035	0.060	0.045	0.035	0.060	0.040
3	0.030	0.050	0.045	0.030	0.050	0.040

Deviation of alloy components from the norms of chemical composition as indicated in table 2 is permissible, but should not exceed the values indicated in table 5.

Table 5

Chemical component	Fraction of total mass component %	Permissible deviation in, %	
		For minimum limit	For maximum limit
Carbon	Upto 0.12	-	+ 0.01
	Above 0.12	- 0.02	+ 0.02
Manganese	Upto 0.90	- 0.10	+ 0.10
	Above 0.90 to 8.00	- 0.12	+ 0.20
	Above 8.00	- 0.50	+ 0.50
Silicon	Upto 0.90	- 0.10	+ 0.10
	Above 0.90	- 0.10	+ 0.20
Chromium	Upto 5.00	- 0.20	+ 0.20
	Above 5.00 to 20.00	- 0.50	+ 0.50
	Above 20.00	- 1.00	+ 1.00
Nickel	Upto 1.00	- 0.10	+ 0.10
	Above 1.00 to 2.00	- 0.15	+ 0.10
	Above 2.00 to 3.00	- 0.20	+ 0.20
	Above 3.00 to 6.00	- 0.25	+ 0.20
	Above 6.00	- 0.50	+ 0.50
Molybdenum	For all contents of component	- 0.02	+ 0.02
Titanium	Upto 0.50	- 0.03	+ 0.03
	Above 0.50 to 1.0	- 0.05	+ 0.05
	Above 1.0	- 0.10	+ 0.10
Vanadium	For all contents of component	- 0.02	+ 0.03

Contd., Table 5

Chemical component	Fraction of total mass of component, %	Permissible deviation in, %	
		For minimum limit	For maximum limit
Tungsten	For all contents of component	- 0.05	+ 0.05
Niobium	For all contents of component	- 0.02	+ 0.02
Copper	For all contents of component	- 0.1	+ 0.1

Note:

1. For steel grade 85X4M5Φ2B6Л (P6M5Л) deviation of fraction of total mass of vanadium $\pm 0.1\%$ is permissible.
2. For steel grade 90X4M4Φ2B6Л (P6M4Φ2Л) deviation of fraction of total mass of vanadium - minus 0.2; plus 0.1%.

2. MAIN PARAMETERS AND DIMENSIONS

- 2.1. Depending on the purpose and requirement of the parts, castings are divided into three groups in accordance with table 6.

Table 6

Castings group	Purpose	Characteristics of casting	List of characteristics of quality to be checked
1	Casting for general purpose	Casting for parts, configuration and dimensions which are determined only structural and terminological reasons	Appearance, dimensions, chemical composition
2	Casting of critical and special purpose	Casting for parts, meant for strength and working at static load	Appearance, dimensions, chemical composition, mechanical characteristics, yield point or ultimate strength and elongation

Contd., Table 6

Castings group	Purpose	Characteristics of casting	List of characteristics of quality to be checked
3	Casting of highly critical and specific purposes	Casting for parts, meant for strength and working at cyclic and dynamic loads.	Appearances, dimensions, chemical composition, mechanical properties, yield point or ultimate strength and elongation and impact strength.

Note:

1. In case of necessity for introduction of additional point, which are not indicated in table 6 for the given groups of casting, their appearance and conformity of norms should be indicated in design document (КД) and (or) in standard technical document (HTД).

As per the requirement of the user, in the number of additional checking points, the following point, may be added: Hardness, fracture of material, mechanical characteristics, for casting with wall thickness more than 100 mm, mechanical characteristics at high and low temperatures, leak proofness, microstructure, density, corrosion resistance, heat resistance, resistance against inter crystalline corrosion and others.

For casting of 3rd groups, meant for items, subject to acceptance by customer representative, working at low temperature and subject to dynamic loading, if indications in design document (КД) and (or) standard technical document (HTД) impact strength of steel is determined at temperature of minus 50^oC. Norms of impact strength during this, is indicated in design document (КД) and (or) standard technical document (HTД) for specific products.

2. The possibility of specifying relative contraction as a parameter to be controlled instead of elongation is indicated in design document (КД) and (or) standard technical document.

3. The possibility of increasing norms of strength with corresponding reduction of plasticity and strength is indicated design document (КД) and (or) in technical standard document.

4. Norms, possibility of reduction of mechanical characteristics level in samples, which are meant for casting is indicated in design document (КД).

5. For casting 2nd and 3rd groups, meant for items, which subject to acceptance by the customer representative, replacing «yield point» by point «ultimate strength» is permissible only as per the requirement of the customer representative.

Marking of casting in technical specifications of charts:

For casting 1st group:

Casting 1st groups GOST 977 – 88

For casting 2nd group:

Casting 2nd group GOST 977 – 88

For casting 3rd group:

Casting 3rd group GOST 977 – 88

2.2 Casting group, steel grade, additional checking points and requirement are indicated in design document (КД) and (or) in technical standard document (HTД) During continuous mass

production, division of casting as per groups is not carried out, List of characteristics to be checked are specified in the drawing on castings.

3. TECHNICAL REQUIREMENTS

3.1. Casting is prepared in accordance with the requirements of present standard, design document (КД) and (or) technical standard document, approved in established order.

3.2. Casting should be subject to heat treatment. Recommended conditions of heat treatment of structural non-alloy and alloy steel are given in appendix 3, alloy steel with special composition in appendix 4.

As per the agreement between manufacturer and customer, it is permissible not to carry out heat treatment of casting of 1st group from the structural non-alloy and alloy steel and casting 1st to 3rd groups from the alloy steel and steel with special characteristics while ensuring mechanical and special composition of steel of technological smelting and shaping.

The number of permissible full heat treatment of casting should not be more than three, and for casting from the austenite-ferrite alloy steels with special composition – not more than two.

Note: Number of tempering or stabilizing annealing of casting with test piece of similar group after hardening or normalizing for obtaining required mechanical characteristics is not restricted.

3.3. Mechanical characteristics of structural non-alloy and alloy steel for casting with wall thickness up to 100 mm at room temperature after finishing the heat treatment should be in accordance with the norms indicated in table 7, and for alloy steel with special properties – as per table 8.

3.4. Configuration and dimensions of castings should be in accordance with the drawing, which are approved, in the set order.

Tolerance of dimensions and weight of casting and also machining allowance should be in accordance with the requirements of GOST 26645, draft angle – GOST 3212 or indicated in the design document (КД).

3.5. Casting should be dressed against the moulding mixture, scales and over heating. Riser and gate should be removed.

Place of cut of gate and riser, scabs and break through should be dressed or trimmed within the tolerance as per casting drawing.

Upon agreement between manufacturer and customer, over heating in the castings is allowed as specified in Design document and (or) standard technical documents.

Grade of steel	Strength category	Yield stress, σ_t , M Pa	Ultimate strength, δ_t , M pa	Elongation δ , %	Reduction of area Ψ , %	Impact strength KCU $k J / m^2$
		Not less than				
		Normalization or normalization with tempering				
						Structural
15Л	K20	196	392	24	35	491
20Л	K20	216	412	22	35	491
25Л	K20	235	441	19	30	392
30Л	K25	255	471	17	30	343
35Л	K25	275	491	15	25	343
40Л	K30	294	520	14	25	294
45Л	K30	314	540	12	20	294
50Л	K30	334	569	11	20	245
						Structural
20ГЛ	K25	275	540	18	25	491
35ГЛ	K30	294	540	12	20	294
20ГСЛ	K30	294	540	18	30	294
30ГСЛ	K35	343	589	14	25	294
20Г1ФЛ	K30	314	510	17	25	491
20ФЛ	K30	294	491	18	35	491
30ХГСФЛ	K40	392	589	15	25	343
45ФЛ	K40	392	589	12	20	294
32Х06Л	-	-	-	-	-	-
40ХЛ	-	-	-	-	-	-
20ХМЛ	K25	245	441	18	30	294
20ХМФЛ	K25	275	491	16	35	294
20ГНМФЛ	K50	491	589	15	33	491
35ХМЛ	K40	392	589	12	20	294
30ХНМЛ	K55	540	687	12	20	294
35ХГСЛ	K35	343	589	14	25	294
35НГМЛ	-	-	-	-	-	-
20ДХЛ	K40	392	491	12	30	294
08ГДНФЛ	K35	343	441	18	30	491
13ХНДФТЛ	K40	392	491	18	30	491
12ДН2ФЛ	K55	540	638	12	20	294
12ДХН1МФЛ	K65	638	785	12	20	294
23ХГС2МФЛ						
12Х7Г3СЛ						
25Х2ГНМФЛ ¹						
25Х2ГНМФЛ ²						
27Х5ГСМЛ						
30Х3С3ГМЛ						
03Н12Х5М3ТЛ						
03Н12Х5М3ТЮЛ						

Table 7

Strength category	Yield stress, σ_t , M Pa	Ultimate strength, δ_t , M pa	Elongation, δ , %	Reduction of area Ψ , %	Impact strength KCU k J / m ²
Not less than					
Hardening and tempering					
Non – alloy steel					
-	-	-	-	-	-
-	-	-	-	-	-
KT30	294	491	22	33	343
KT30	294	491	17	20	343
KT35	343	540	16	20	294
KT35	343	540	14	20	294
KT40	392	589	10	20	245
KT40	392	736	14	20	294
Alloy steel					
KT30	334	530	14	25	383
KT35	343	589	14	30	491
-	-	-	-	-	-
KT40	392	638	14	30	491
-	-	-	-	-	-
-	-	-	-	-	-
KT60	589	785	14	25	441
KT50	491	687	12	20	294
KT45	441	638	10	20	491
KT50	491	638	12	25	392
-	-	-	-	-	-
-	-	-	-	-	-
KT60	589	687	14	30	589
KT55	540	687	12	25	392
KT65	638	785	10	20	392
KT60	589	785	10	20	392
KT60	589	736	12	25	392
KT55	540	638	12	30	392
-	-	-	-	-	-
-	-	-	-	-	-
KT65	638	785	12	25	392
KT75	735	981	10	20	294
KT110	1079	1275	6	24	392
KT110	1079	1324	9	40	589
KT50	491	638	12	30	589
KT110	1079	1275	5	25	392
KT120	1177	1472	5	20	392
KT150	1472	1766	4	15	196
KT130	1275	1324	8	45	491
KT145	1422	1472	8	35	294