

Designation		Chemical composition (cast analysis) (% min.)								
Name	Number	C	Si max	Mn	P max	S max	Cr	Mo	Ni	others
GP240GH	1.0619	0,18 to 0,23	0,60	0,50 to 1,20	0,030	0,020 ¹⁾	--	--	--	--
G20Mo5	1.5419	0,18 to 0,23	0,60	0,50 to 1,00	0,025	0,020 ¹⁾	--	0,40 to 0,60	--	--
G17CrMo5-5	1.7357	0,15 to 0,20	0,60	0,50 to 1,00	0,020	0,020 ¹⁾	1,00 to 1,50	0,45 to 0,65	--	--
G17CrMo9-10	1.7379	0,13 to 0,20	0,60	0,50 to 0,90	0,020	0,020 ¹⁾	2,00 to 2,50	0,90 to 1,20	--	--
GX15CrMo5	1.7365	0,12 to 0,19	0,80	0,50 to 0,80	0,025	0,025	4,00 to 6,00	0,45 to 0,65	--	--
G20Mn5	1.6220	0,17 to 0,23	0,60	1,00 to 1,60	0,020	0,020 ¹⁾	--	--	0,80 max	--
G9Ni10	1.5636	0,06 to 0,12	0,60	0,50 to 0,80	0,020	0,015	--	--	2,00 to 3,00	--
G9Ni14	1.5638	0,06 to 0,12	0,60	0,50 to 0,80	0,020	0,015	--	--	3,00 to 4,00	--
GX5CrNi19-10 2)	1.4308 2)	0,07 max	1,50	1,50	0,040	0,030	18,00 to 20,00	--	8,00 to 11,00	--
GX5CrNiNb19-11 2)	1.4552 2)	0,07 max	1,50	1,50	0,040	0,030	18,00 to 20,00	--	9,00 to 12,00	Nb: 8 x C, max: 1,00
GX5CrNiMo19-11-2 2)	1.4408 2)	0,07 max	1,50	1,50	0,040	0,030	18,00 to 20,00	2,00 to 2,50	9,00 to 12,00	--
GX5CrNiMoNb19-11-2 2)	1.4581 2)	0,07 max	1,50	1,50	0,040	0,030	18,00 to 20,00	2,00 to 2,50	9,00 to 12,00	Nb: 8 x C, max: 1,00
GX2CrNiMoN22-5-3	1.4470	0,03 max	1,00	2,00	0,035	0,025	21,00 to 23,00	2,50 to 3,50	4,50 to 6,50	N: 0,12 to 0,20

1) For castings of ruling thickness <28 mm, % 0,030 S is permitted

2) It should be pointed out that the suggested chemical composition ranges of these alloyed corrosion resistant steel grades are rather large. According to the final destination (high temperature/low temperature, etc...) it may be advisable for the founder to aim for narrower ranges for different elements in order to achieve the most suitable structures.

MECHANICAL PROPERTIES

Designation		Heat treatment °C		Test at room temperature				Test at elevated temperature									
Name	Number	Symbol 2)	Normalizing (+ N) or Quenching (+ Q) 1)	Tempering (+T)	Tensile test			Impact test		Tensile test							
					Rp0,2 Mpa *)	Rm Mpa *)	A % min	KV J min.	Rp0,2 Mpa *) min at °C								
					min				100°	200°	300°	350°	400°	450°	500°	550°	
GP240GH	1.0619	+ N	900 to 980	--	240	420 to 600	22	27	210	175	145	135	130	125	--	--	
					890 to 980	600 to 700	240	420 to 600	22	40	210	175	145	135	130	125	--
G20Mo5	1.5419	+ QT	920 to 980	650 to 730	245	440 to 590	22	27	--	190	165	155	150	145	135	--	
G17CrMo5-5	1.7357	+ QT	920 to 980	680 to 730	315	490 to 690	20	27	--	250	230	215	200	190	175	160	
G17CrMo9-10	1.7379	+ QT	930 to 970	680 to 740	400	590 to 740	18	40	--	355	345	330	315	305	280	240	
GX15CrMo5	1.7365	+ QT	930 to 990	680 to 730	420	630 to 760	16	27	--	390	380	--	370	--	305	250	

1) +Q means quenching media: air or liquid. +T = tempering. +N = normalizing

2) If there are alternative specifications for heat treatment, the requested alternative shall be indicated on the order, e.g.: GP240GH +QT1 or 1.0619 +QT1

*) 1 Mpa = 1N/mm²

Designation		Heat treatment °C		Test at room temperature			Impact test		
Name	Number	Symbol 1)	Quenching	Tempering	Tensile strength			KV J min.	At °C
					Rp0,2 Mpa *)	Rm Mpa *)	A % min		
					min				
G20Mn5	1.6220	+ N	900 to 980	--	300	480 to 620	20	27	-30
					900 to 940	610 to 660	300	500 to 650	22
G9Ni10	1.5636	+ QT	830 to 890	600 to 650	280	480 to 630	24	27	-70
G9Ni14	1.5638	+ QT	820 to 900	590 to 650	360	500 to 650	20	27	-90

1) +Q: quenching in water. +T = tempering. +N = normalizing.

*) 1 Mpa = 1 N/mm²

Designation		Heat treatment		Test at room temperature				Test at elevated temperature									
Name	Number	+ AT 1) °C		Tensile test			Impact test		Tensile test								
					Rp1,0 5) Mpa *)	Rm Mpa *)	A % min	KV J min.	°C 8)	Rp1,0 5) Mpa *) min. at °C							
					min					100°	200°	300°	350°	400°	500°	550°	
GX5CrNi19-10	1.4308	1050 to 1150		200	440 to 640	30	60 7)	RT 7)	160	125	110	--	--	--	--	--	
GX5CrNiNb19-11	1.4552	1050 to 1150		200	440 to 640	25	40	RT	165	145	130	--	120	110	100	--	
GX5CrNiMo19-11-2	1.4408	1080 to 1150		210	440 to 640	30	60 7)	RT 7)	170	135	115	--	105	--	--	--	
GX5CrNiMoNb19-11-2	1.4581	1080 to 1150		210	440 to 640	25	40	RT	185	160	145	--	130	120	115	--	
GX2CrNiMoN22-5-3	1.4470	1120 to 1150 2) 3)		420 6)	600 to 800	20	30	RT	330 6)	280 6)	4)	--	--	--	--	--	

1) The heat treatment for all the steel grades is +AT +QW (solution annealing + water quenching).

2) After solution annealing at high temperature, castings may be cooled down to 1040 °C to 1010 °C prior to water quenching in order to improve corrosion resistance and prevent cracks in complex shapes.

3) As far as steel castings for pressure vessel are concerned the austenitic-ferritic steel are not considered in their age hardened condition.

4) For similar reasons as those concerning note 3) the austenitic-ferritic steel have not to be used for temperatures higher than 250 °C in pressure vessel applications.

5) Rp0,2 may be estimated by lowering Rp1,0 by 25 Mpa.

6) Rp0,2

7) For use at low temperature impact properties may be agreed and the following applies: Steel number 1.4308 KV J min. 60 at -196 °C.

8) RT = Room temperature. *) 1 Mpa = 1 N/mm²

