

Table 1 — Chemical composition (cast analysis) of ferritic corrosion resisting steels

Steel designation		% by mass									
Name	Number	C max.	Si max.	Mn max.	P max.	S max.	N max.	Cr	Mo	Ni	Others
Standard grades											
X2CrNi12	1.4003	0,030	1,00	1,50	0,040	0,015	0,030	10,5 to 12,5	-	0,30 to 1,00	-
X2CrTi12	1.4512	0,030	1,00	1,00	0,040	0,015	-	10,5 to 12,5	-	-	Ti: [6x(C+N)] to 0,65
X6Cr17	1.4016	0,08	1,00	1,00	0,040	0,015 ^a	-	16,0 to 18,0	-	-	-
X3CrTi17	1.4510	0,05	1,00	1,00	0,040	0,015 ^a	-	16,0 to 18,0	-	-	Ti: [4x(C+N) + 0,15] to 0,80 ^b
X2CrMoTi18-2	1.4521	0,025	1,00	1,00	0,040	0,015	0,030	17,0 to 20,0	1,80 to 2,50	-	Ti: [4x(C+N) + 0,15] to 0,80 ^b
Special grades											
X2CrMoTi17-1	1.4513	0,025	1,00	1,00	0,040	0,015	0,020	16,0 to 18,0	0,80 to 1,40	-	Ti: 0,30 to 0,60
X6CrMoNb17-1	1.4526	0,08	1,00	1,00	0,040	0,015	0,040	16,0 to 18,0	0,80 to 1,40	-	Nb: [7x(C+N)+0,10] to 1,00
X2CrTiNb18	1.4509	0,030	1,00	1,00	0,040	0,015	-	17,5 to 18,5	-	-	Ti: 0,10 to 0,60 Nb: [3xC+0,30] to 1,00
All precautions shall be taken to avoid the addition of such elements not quoted in the table from scrap and other materials used in production which would impair mechanical properties and the suitability of the steel.											
^a Particular ranges of sulphur content can provide improvement of particular properties. For machinability a controlled sulphur content of 0,015 % to 0,030 % is recommended and shall be permitted. For weldability, a controlled sulphur content of 0,008 % to 0,015 % is recommended. For polishability, a controlled sulphur content of 0,015 % max. is recommended.											
^b The stabilisation may be by use of titanium or niobium or zirconium. According to the atomic mass of these elements and the content of carbon and nitrogen, the equivalence shall be the following: Nb (% by mass) = Zr (% by mass) = 7/4 Ti (% by mass).											

Table 2 — Chemical composition (cast analysis) of martensitic and precipitation hardening corrosion resisting steels

Steel designation		% by mass									
Name	Number	C	Si max.	Mn max	P max.	S max.	Cr	Cu	Mo	Ni	Others
Standard grades (martensitic steels)											
X12Cr13	1.4006	0,08 to 0,15	1,00	1,50	0,040	0,015 ^a	11,5 to 13,5	-	-	≤ 0,75	-
X20Cr13	1.4021	0,16 to 0,25	1,00	1,50	0,040	0,015 ^a	12,0 to 14,0	-	-	-	-
X4CrNiMo16-5-1	1.4418	≤ 0,06	0,70	1,50	0,040	0,015 ^a	15,0 to 17,0	-	0,80 to 1,50	4,0 to 6,0	N: ≥ 0,020
Special grades (precipitation hardening steels)											
X5CrNiCuNb16-4	1.4542	≤ 0,07	0,70	1,50	0,040	0,015 ^a	15,0 to 17,0	3,0 to 5,0	≤ 0,60	3,0 to 5,0	Nb: 5xC to 0,45
X7CrNiAl17-7	1.4568	≤ 0,09	0,70	1,00	0,040	0,015	16,0 to 18,0	-	-	6,5 to 7,8 ^b	Al: 0,70 to 1,50
All precautions shall be taken to avoid the addition of such elements not quoted in the table from scrap and other materials used in production which would impair mechanical properties and the suitability of the steel.											
^a Particular ranges of sulphur content can provide improvement of particular properties. For machinability a controlled sulphur content of 0,015 % to 0,030 % is recommended and shall be permitted. For weldability, a controlled sulphur content of 0,008 % to 0,015 % is recommended. For polishability, a controlled sulphur content of 0,015 % max. is recommended.											
^b For better cold deformability, the upper limit may be increased to 8,3 %.											

Table 3 — Chemical composition (cast analysis) of austenitic corrosion resisting steels

Steel designation		% by mass											
Name	Number	C	Si	Mn	P max.	S	N	Cr	Cu	Mo	Nb	Ni	Others
Standard grades													
X2CrNiN18-7	1.4318	≤ 0,030	≤ 1,00	≤ 2,00	0,045	≤ 0,015	0,10 to 0,20	16,5 to 18,5	-	-	-	6,0 to 8,0	-
X2CrNi18-9	1.4307	≤ 0,030	≤ 1,00	≤ 2,00	0,045	≤ 0,015 ^a	≤ 0,10	17,5 to 19,5	-	-	-	8,0 to 10,5	-
X2CrNi19-11	1.4306	≤ 0,030	≤ 1,00	≤ 2,00	0,045	≤ 0,015 ^a	≤ 0,10	18,0 to 20,0	-	-	-	10,0 to 12,0	-
X2CrNiN18-10	1.4311	≤ 0,030	≤ 1,00	≤ 2,00	0,045	≤ 0,015 ^a	0,12 to 0,22	17,5 to 19,5	-	-	-	8,5 to 11,5	-
X5CrNi18-10	1.4301	≤ 0,07	≤ 1,00	≤ 2,00	0,045	≤ 0,015 ^a	≤ 0,10	17,5 to 19,5	-	-	-	8,0 to 10,5	-
X6CrNiTi18-10	1.4541	≤ 0,08	≤ 1,00	≤ 2,00	0,045	≤ 0,015 ^a	-	17,0 to 19,0	-	-	-	9,0 to 12,0	Ti: 5 x C to 0,70
X2CrNiMo17-12-2	1.4404	≤ 0,030	≤ 1,00	≤ 2,00	0,045	≤ 0,015 ^a	≤ 0,10	16,5 to 18,5	-	2,00 to 2,50	-	10,0 to 13,0	-
X2CrNiMoN17-11-2	1.4406	≤ 0,030	≤ 1,00	≤ 2,00	0,045	≤ 0,015 ^a	0,12 to 0,22	16,5 to 18,5	-	2,00 to 2,50	-	10,0 to 12,5	-
X5CrNiMo17-12-2	1.4401	≤ 0,07	≤ 1,00	≤ 2,00	0,045	≤ 0,015 ^a	≤ 0,10	16,5 to 18,5	-	2,00 to 2,50	-	10,0 to 13,0	-
X6CrNiMoTi17-12-2	1.4571	≤ 0,08	≤ 1,00	≤ 2,00	0,045	≤ 0,015 ^a	-	16,5 to 18,5	-	2,00 to 2,50	-	10,5 to 13,5	Ti: 5 x C to 0,70
X2CrNiMo17-12-3	1.4432	≤ 0,030	≤ 1,00	≤ 2,00	0,045	≤ 0,015 ^a	≤ 0,10	16,5 to 18,5	-	2,50 to 3,00	-	10,5 to 13,0	-
X2CrNiMo18-14-3	1.4435	≤ 0,030	≤ 1,00	≤ 2,00	0,045	≤ 0,015 ^a	≤ 0,10	17,0 to 19,0	-	2,50 to 3,00	-	12,5 to 15,0	-
X2CrNiMoN17-13-5	1.4439	≤ 0,030	≤ 1,00	≤ 2,00	0,045	≤ 0,015 ^a	0,12 to 0,22	16,5 to 18,5	-	4,0 to 5,0	-	12,5 to 14,5	-
X1NiCrMoCu25-20-5	1.4539	≤ 0,020	≤ 0,70	≤ 2,00	0,030	≤ 0,010	≤ 0,15	19,0 to 21,0	1,20 to 2,00	4,0 to 5,0	-	24,0 to 26,0	-
Special grades													
X1CrNi25-21	1.4335	≤ 0,020	≤ 0,25	≤ 2,00	0,025	≤ 0,010	≤ 0,10	24,0 to 26,0	-	≤ 0,20	-	20,0 to 22,0	-
X1CrNiMoN25-22-2	1.4466	≤ 0,020	≤ 0,70	≤ 2,00	0,025	≤ 0,010	0,10 to 0,16	24,0 to 26,0	-	2,00 to 2,50	-	21,0 to 23,0	-
X2CrNiMoN17-13-3	1.4429	≤ 0,030	≤ 1,00	≤ 2,00	0,045	≤ 0,015	0,12 to 0,22	16,5 to 18,5	-	2,50 to 3,00	-	11,0 to 14,0	-
X3CrNiMo17-13-3	1.4436	≤ 0,05	≤ 1,00	≤ 2,00	0,045	≤ 0,015 ^a	≤ 0,10	16,5 to 18,5	-	2,50 to 3,00	-	10,5 to 13,0	-
X2CrNiMo18-15-4	1.4438	≤ 0,030	≤ 1,00	≤ 2,00	0,045	≤ 0,015 ^a	≤ 0,10	17,5 to 19,5	-	3,0 to 4,0	-	13,0 to 16,0	-
X12CrMnNiN17-7-5	1.4372	≤ 0,15	≤ 1,00	5,5 to 7,5	0,045	≤ 0,015	0,05 to 0,25	16,0 to 18,0	-	-	-	3,5 to 5,5	-
X1NiCrMoCu31-27-4	1.4563	≤ 0,020	≤ 0,70	≤ 2,00	0,030	≤ 0,010	≤ 0,10	26,0 to 28,0	0,70 to 1,50	3,0 to 4,0	-	30,0 to 32,0	-
X1CrNiMoCuN20-18-7	1.4547	≤ 0,020	≤ 0,70	≤ 1,00	0,030	≤ 0,010	0,18 to 0,25	19,5 to 20,5	0,50 to 1,00	6,0 to 7,0	-	17,5 to 18,5	-
X1NiCrMoCuN25-20-7	1.4529	≤ 0,020	≤ 0,50	≤ 1,00	0,030	≤ 0,010	0,15 to 0,25	19,0 to 21,0	0,50 to 1,50	6,0 to 7,0	-	24,0 to 26,0	-
X2CrNiMnMoN25-18-6-5	1.4565	≤ 0,030	≤ 1,00	5,0 to 7,0	0,030	≤ 0,015	0,30 to 0,60	24,0 to 26,0	-	4,0 to 5,0	≤ 0,15	16,0 to 19,0	-
All precautions shall be taken to avoid the addition of such elements not quoted in the table from scrap and other materials used in production which would impair mechanical properties and the suitability of the steel.													
^a Particular ranges of sulphur content can provide improvement of particular properties. For machinability a controlled sulphur content of 0,015 % to 0,030 % is recommended and shall be permitted. For weldability, a controlled sulphur content of 0,008 % to 0,015 % is recommended. For polishability, a controlled sulphur content of 0,015 % max. is recommended.													

Table 4— Chemical composition (cast analysis) of austenitic-ferritic corrosion resisting steels

Steel designation		% by mass									
Name	Number	C max.	Si	Mn	P max.	S max.	N	Cr	Cu	Mo	Ni
Standard grades											
X2CrNiN23-4	1.4362	0,030	≤ 1,00	≤ 2,00	0,035	0,015	0,05 to 0,20	22,0 to 24,0	0,10 to 0,60	0,10 to 0,60	3,5 to 5,5
X2CrNiMoN22-5-3 ^a	1.4462 ^a	0,030	≤ 1,00	≤ 2,00	0,035	0,015	0,10 to 0,22	21,0 to 23,0	-	2,50 to 3,5	4,5 to 6,5
Special grades											
X2CrNiMoN29-7-2 ^{*)}	1.4477 ^{*)}	0,030	≤ 0,50	0,80 to 1,50	0,030	0,015	0,30 to 0,40	28,0 to 30,0	≤ 0,80	1,50 to 2,60	5,8 to 7,5
X2CrNiMoN25-7-4	1.4410	0,030	≤ 1,00	≤ 2,00	0,035	0,015	0,24 to 0,35	24,0 to 26,0	-	3,0 to 4,5	6,0 to 8,0
X2CrNiMoSi18-5-3	1.4424	0,030	1,40 to 2,00	1,20 to 2,00	0,035	0,015	0,05 to 0,10	18,0 to 19,0	-	2,50 to 3,0	4,5 to 5,2
X2CrMnNiN21-5-1 ^{*)}	1.4162 ^{*)}	0,040	≤ 1,00	4,0 to 6,0	0,040	0,015	0,20 to 0,25	21,0 to 22,0	0,10 to 0,80	0,10 to 0,80	1,35 to 1,70
All precautions are to be taken to avoid the addition of such elements not quoted in the table from scrap and other materials used in production which would impair mechanical properties and the suitability of the steel.											
^a By agreement, this grade can be delivered with a Pitting Resistance Equivalent Number (PRE = Cr + 3,3 Mo + 16 N, compare Table C.1 of EN 10088-1:2005) greater than 34.											
^{*)} Patented steel grade.											

Table 5— Permissible product analysis tolerances on the limiting values given in Tables 1 to 4 for the cast analysis

Element	Specified limits, cast analysis % by mass		Permissible tolerance ^a % by mass
Carbon		≤ 0,030	+ 0,005
	> 0,030	≤ 0,20	± 0,01
	> 0,20	≤ 0,25	± 0,02
Silicon		≤ 1,00	+ 0,05
	> 1,00	≤ 2,00	± 0,10
Manganese		≤ 1,00	+ 0,03
	> 1,00	≤ 2,00	± 0,04
	> 2,00	≤ 7,5	± 0,10
Phosphorus		≤ 0,045	+0,005
Sulphur		≤ 0,015	+0,003
	> 0,015	≤ 0,030	±0,005
Nitrogen		≤ 0,10	± 0,01
	≥ 0,10	≤ 0,60	± 0,02
Chromium	≥ 10,5	≤ 15,0	± 0,15
	> 15,0	≤ 20,0	± 0,20
	> 20,0	≤ 30,0	± 0,25
Copper		≤ 1,00	± 0,07
	> 1,00	≤ 5,0	± 0,10
Molybdenum		≤ 0,60	± 0,03
	> 0,60	≤ 1,75	± 0,05
	> 1,75	≤ 7,0	± 0,10
Niobium		≤ 1,00	± 0,05
Nickel		≤ 1,00	± 0,03
	> 1,00	≤ 5,0	± 0,07
	> 5,0	≤ 10,0	± 0,10
	> 10,0	≤ 20,0	± 0,15
	> 20,0	≤ 32,0	± 0,20
Aluminium	> 0,30	≤ 1,50	± 0,10
Titanium		≤ 0,80	± 0,05

^a If several product analyses are carried out on one cast, and the contents of an individual element determined lies outside the permissible range of the chemical composition specified for the cast analysis, then it shall be only allowed to exceed the permissible maximum value or to fall short of the permissible minimum value, but not both at the same time.

Table 6— Type of process route and surface finish of sheet, plate and strip

	Symbol ^a	Type of process route	Surface finish	Notes
Hot rolled	1U	Hot rolled, not heat treated, not descaled	Covered with rolling scale	Suitable for products which are to be further worked e.g. strip for rerolling.
	1C	Hot rolled, heat treated, not descaled	Covered with rolling scale	Suitable for parts which will be descaled or machined in subsequent production or for certain heat-resisting applications.
	1E	Hot rolled, heat treated, mechanically descaled	Free of scale	The type of mechanical descaling, e.g. coarse grinding or shot blasting, depends on the steel grade and the product, and is left to the manufacturer's discretion, unless otherwise agreed.
	1D	Hot rolled, heat treated, pickled	Free of scale	Usually standard for most steel types to ensure good corrosion resistance; also common finish for further processing. It is permissible for grinding marks to be present. Not as smooth as 2D or 2B.
Cold rolled	2H	Work hardened	Bright	Cold worked to obtain higher strength level.
	2C	Cold rolled, heat treated, not descaled	Smooth with scale from heat treatment	Suitable for parts which will be descaled or machined in subsequent production or for certain heat-resisting applications.
	2E	Cold rolled, heat treated, mechanically descaled	Rough and dull	Usually applied to steels with a scale which is very resistant to pickling solutions. May be followed by pickling.
	2D	Cold rolled, heat treated, pickled	Smooth	Finish for good ductility, but not as smooth as 2B or 2R.
	2B	Cold rolled, heat treated, pickled, skin passed	Smoothen than 2D	Most common finish for most steel types to ensure good corrosion resistance, smoothness and flatness. Also common finish for further processing. Skin passing may be by tension levelling.
	2R	Cold rolled, bright annealed ^b	Smooth, bright, reflective	Smoothen and brighter than 2B. Also common finish for further processing.
	2Q	Cold rolled, hardened and tempered, scale free	Free of scale	Either hardened and tempered in a protective atmosphere or descaled after heat treatment.
Special finishes	1G or 2G	Ground ^c	See footnote d.	Grade of grit or surface roughness can be specified. Unidirectional texture, not very reflective.
	1J or 2J	Brushed ^c or dull polished ^c	Smoothen than ground. See footnote d.	Grade of brush or polishing belt or surface roughness can be specified. Unidirectional texture, not very reflective.
	1K or 2K	Satin polish ^c	See footnote d.	Additional specific requirements to a "J" type finish, in order to achieve adequate corrosion resistance for marine and external architectural applications. Transverse R _a < 0,5 µm with clean cut surface finish.
	1P or 2P	Bright polished ^c	See footnote d.	Mechanical polishing. Process or surface roughness can be specified. Non-directional finish, reflective with high degree of image clarity.
	2F	Cold rolled, heat treated, skin passed on roughened rolls	Uniform non-reflective matt surface.	Heat treatment by bright annealing or by annealing and pickling.
	1M	Patterned	Design to be agreed; 2 nd surface flat	Chequer plates used for floors.
	2M			A fine texture finish mainly used for architectural applications.
	2W	Corrugated	Design to be agreed	Used to increase strength and/or for cosmetic effect.
	2L	Coloured ^c	Colour to be agreed	
	1S or 2S	Surface coated ^c		Coated with e.g. tin, aluminium.

NOTE Not all process routes and surface finishes are available for all steels.

^a First digit: 1 = hot rolled, 2 = cold rolled.
^b May be skin passed.
^c One surface only, unless specifically agreed at the time of enquiry and order.
^d Within each finish description the surface characteristics may vary, and more specific requirements may need to be agreed between manufacturer and purchaser (e.g. grade of grit or surface roughness).

Table 7 — Mechanical properties at room temperature of ferritic steels in the annealed condition (see Table A.1) and resistance to intergranular corrosion

Steel designation		Product form a	Thickness mm max.	0,2 %- proof strength		Tensile strength R _m MPa ¹⁾	Elongation after fracture		Resistance to intergranular corrosion ^d	
Name	Number			R _{p0,2} MPa ¹⁾ min. (long.)	R _{p0,2} MPa ¹⁾ min. (tr.)		A _{80 mm} ^b < 3 mm thick % min. (long. + tr.)	A ^c ≥ 3 mm thick % min. (long. + tr.)	In the delivery condition	in the welded condition
Standard grades										
X2CrNi12	1.4003	C	8	280	320	450 to 650	20	no	no	
		H	13,5							
		P	25 ^e	250	280		18			
X2CrTi12	1.4512	C	8	210	220	380 to 560	25	no	no	
		H	13,5							
X6Cr17	1.4016	C	8	260	280	450 to 600	20	yes	no	
		H	13,5	240	260		18			
		P	25 ^e	240	260	430 to 630	20			
X3CrTi17	1.4510	C	8	230	240	420 to 600	23	yes	yes	
		H	13,5							
X2CrMoTi18-2	1.4521	C	8	300	320	420 to 640	20	yes	yes	
		H	13,5	280	300	400 to 600				
		P	12	280	300	420 to 620				
Special grades										
X2CrMoTi17-1	1.4513	C	8	200	220	400 to 550	23	yes	yes	
X6CrMoNb17-1	1.4526	C	8	280	300	480 to 560	25	yes	yes	
X2CrTiNb18	1.4509	C	8	230	250	430 to 630	18	yes	yes	
a C = cold rolled strip; H = hot rolled strip; P = hot rolled plate. b The values apply for test pieces with a gauge length of 80 mm and a width of 20 mm. Test pieces with a gauge length of 50 mm and a width of 12,5 mm can also be used. c The values apply for test pieces with a gauge length of 5,65 √S ₀ . d When tested according to EN ISO 3651-2. e For thicknesses above 25 mm the mechanical properties can be agreed. 1) 1 MPa = 1 N/mm ² .										

Table 8 — Mechanical properties at room temperature of martensitic steels in the heat-treated condition (see Table A.2)

Steel designation		Product form ^a	Thick-ness mm max.	Heat-treat-ment- condi- tion ^b	Hardness ^c		0,2 %- proof strength <i>R</i> _{p0,2} MPa ¹⁾ min.	Tensile strength <i>R</i> _m MPa ¹⁾	Elongation after fracture		Impact energy (ISO-V) KV > 10 mm thick J min.	Hardness	
Name	Number				HRB	HB or HV			<i>A</i> _{80 mm^d} < 3 mm thick % min. (long. + tr.)	<i>A</i> ^e ≥ 3 mm thick % min. (long.+tr.)		HRC	HV
Standard grades													
X12Cr13	1.4006	C	8	+A	90	200	-	max. 600	20		-	-	-
		H	13,5										
		P ^{f,g}	75	+QT550	-		400	550 to 750	15		by agreement	-	-
+QT650	450			650 to 850			12						
X20Cr13	1.4021	C	3	+QT	-	-	-	-	-		-	44 to 50	440 to 530
		C	8	+A	95	225	-	max. 700	15		-	-	-
		H	13,5										
		P ^{f,g}	75	+QT650	-		450	650 to 850	12		by agreement	-	-
				+QT750			550	750 to 950	10				
X4CrNiMo16-5-1	1.4418	P ^g	75	+QT840	-	-	660	840 to 1100	14		55	-	-
^a C = cold rolled strip; H = hot rolled strip; P = hot rolled plate. ^b +A = annealed, +QT = quenched and tempered. ^c The Brinell or Vickers or Rockwell hardness is normally determined for product forms C and H in heat treatment condition A. The tensile test shall be carried out in referee testing. ^d The values apply for test pieces with a gauge length of 80 mm and a width of 20 mm; test pieces with a gauge length of 50 mm and a width of 12,5 mm may also be used. ^e The values apply for test pieces with a gauge length of 5,65 √S ₀ . ^f Plates may also be delivered in the annealed condition; in such cases the mechanical properties are to be agreed at the time of enquiry and order. ^g For thicknesses above 75 mm, the mechanical properties can be agreed. ¹⁾ 1 MPa = 1 N/mm ²													

Table 9 — Mechanical properties at room temperature of precipitation hardening steels in the heat treated condition (see Table A.3)

Steel designation		Product form ^a	Thick-ness	Heat-treatment condition ^b	0,2 %-proof strength	Tensile strength	Elongation after fracture	
Name	Number						$R_{p0,2}$	R_m
			mm max.		MPa ^j min.	MPa ^j		
Special grades								
X5CrNiCuNb16-4	1.4542	C	8	+AT ^e	-	≤ 1275	5	
				+P1300 ^f	1150	≥ 1300	3	
				+P900 ^f	700	≥ 900	6	
		P	50	+P1070 ^g	1000	1070 to 1270	8	10
				+P950 ^g	800	950 to 1150	10	12
				+P850 ^g	600	850 to 1050	12	14
				+SR630 ^h	-	≤ 1050	-	
X7CrNiAl17-7	1.4568	C	8	+AT ^e	-	≤ 1030	19	
				+P1450 ^f	1310	≥ 1450	2	

^a C = cold rolled strip; P = hot rolled plate

^b +AT = solution annealed; +P = precipitation hardened

^c The values apply for test pieces with a gauge length of 80 mm and a width of 20 mm; test pieces with a gauge length of 50 mm and a width of 12,5 mm can also be used.

^d The values apply for test pieces with a gauge length of 5,65 √S₀.

^e Delivery condition.

^f Condition of application; other precipitation hardening temperatures may be agreed.

^g If ordered in the finally treated condition.

^h Delivery condition for further processing; final treatment according to table A.3.

^j 1 MPa = 1 N/mm².

Table 10 — Mechanical properties at room temperature of austenitic steels in the solution annealed condition (see Table A.4) and resistance to intergranular corrosion

Steel designation		Product form ^a	Thick-ness	0,2%-proof strength	1%-proof strength	Tensile strength	Elongation after fracture		Impact energy (ISO-V)		Resistance to intergranular corrosion ^g			
Name	Number			<i>R</i> _{p0,2}	<i>R</i> _{p1,0} ^b		<i>R</i> _m	<i>A</i> ₈₀ ^{c, e}	<i>A</i> ₅ ^{c, f}	<i>KV</i>		in the delivery condition	in the sensitized condition ^h	
				mm max.	MPa ⁱ min.			MPa ⁱ	< 3 mm thick	≥ 3 mm thick	> 10 mm thick			
									% min.	% min.	J min.			J min.
(tr.) ^{c, d}														
Standard grades														
X2CrNiN18-7	1.4318	C	8	350	380	650 to 850	35	40	-	-	yes	yes		
		H	13,5	330	370	630 to 830	45	45	90	60				
		P ^j	75	330	370				-	-				
X2CrNi18-9	1.4307	C	8	220	250	520 to 700	45	45	-	-	yes	yes		
		H	13,5	200	240	500 to 700			100	60				
		P ^j	75	200	240				-	-				
X2CrNi19-11	1.4306	C	8	220	250	520 to 700	45	45	-	-	yes	yes		
		H	13,5	200	240	500 to 700			100	60				
		P ^j	75	200	240				-	-				
X2CrNiN18-10	1.4311	C	8	290	320	550 to 750	40	40	-	-	yes	yes		
		H	13,5	270	310				100	60				
		P ^j	75	270	310				-	-				
X5CrNi18-10	1.4301	C	8	230	260	540 to 750	45 ^j	45 ^j	-	-	yes	no ^k		
		H	13,5	210	250	520 to 720	45	45	100	60				
		P ^j	75	210	250	-			-					
X6CrNiTi18-10	1.4541	C	8	220	250	520 to 720	40	40	-	-	yes	yes		
		H	13,5	200	240	500 to 700			100	60				
		P ^j	75	200	240				-	-				
X2CrNiMo17-12-2	1.4404	C	8	240	270	530 to 680	40	40	-	-	yes	yes		
		H	13,5	220	260	520 to 670	45	45	100	60				
		P ^j	75	220	260				-	-				
X2CrNiMoN17-11-2	1.4406	C	8	300	330	580 to 780	40	40	-	-	yes	yes		
		H	13,5	280	320				100	60				
		P ^j	75	280	320				-	-				
X5CrNiMo17-12-2	1.4401	C	8	240	270	530 to 680	40	40	-	-	yes	no ^k		
		H	13,5	220	260	520 to 670	45	45	100	60				
		P ^j	75	220	260				-	-				
X6CrNiMoTi17-12-2	1.4571	C	8	240	270	540 to 690	40	40	-	-	yes	yes		
		H	13,5	220	260	520 to 670			100	60				
		P ^j	75	220	260				-	-				
X2CrNiMo17-12-3	1.4432	C	8	240	270	550 to 700	40	40	-	-	yes	yes		
		H	13,5	220	260	520 to 670	45	45	100	60				
		P ^j	75	220	260				-	-				
X2CrNiMo18-14-3	1.4435	C	8	240	270	550 to 700	40	40	-	-	yes	yes		
		H	13,5	220	260	520 to 670	45	45	100	60				
		P ^j	75	220	260				-	-				
X2CrNiMoN17-13-5	1.4439	C	8	290	320	580 to 780	35	35	-	-	yes	yes		
		H	13,5	270	310		40	40	100	60				
		P ^j	75	270	310				-	-				
X1NiCrMoCu25-20-5	1.4539	C	8	240	270	530 to 730	35	35	-	-	yes	yes		
		H	13,5	220	260	520 to 720			100	60				
		P ^j	75						-	-				

Table 10 (continued)

Steel designation		Product form ^a	Thick- ness	0,2 %- proof- strength	1 %- proof- strength ^h	Tensile strength	Elongation after fracture		Impact energy (ISO-V)		Resistance to intergranular corrosion ^g	
Name	Number						$A_{80}^{c,e}$ < 3 mm thick	$A^{c,f}$ ≥ 3 mm thick	> 10 mm thick		in the delivery conditio- n	in the sensitized condition ^h
			mm max.	$R_{p0,2}$ MPa ^j min. (tr.) ^{c,d}	$R_{p1,0}$ MPa ^j min. (tr.) ^{c,d}	R_m MPa ^j min. (tr.) ^{c,d}	% min. (tr.) ^{c,d}	% min. (tr.) ^{c,d}	KV J min. (long.)	J min. (tr.)		
Special grades												
X1CrNi25-21	1.4335	P	75	200	240	470 to 670	40	40	100	60	yes	yes
X1CrNiMoN25-22-2	1.4466	P ⁱ	75	250	290	540 to 740	40	40	100	60	yes	yes
X2CrNiMoN17-13-3	1.4429	C	8	300	330	580 to 780	35	35	-	-	yes	yes
		H	13,5	280	320		40	40	100	60		
		P ^j	75	280	320		40	40	100	60		
X3CrNiMo17-13-3	1.4436	C	8	240	270	550 to 700	40	40	-	-	yes	no ^k
		H	13,5	220	260		40	40	100	60		
		P ^j	75	220	260		40	40	100	60		
X2CrNiMo18-15-4	1.4438	C	8	240	270	550 to 700	35	35	-	-	yes	yes
		H	13,5	220	260		40	40	100	60		
		P ^j	75	220	260		40	40	100	60		
X12CrMnNiN17-7-5	1.4372	C	8	350	380	750 to 950	45	45	-	-	yes	no
		H	13,5	330	370		40	40	100	60		
		P ^j	75	330	370		40	40	100	60		
X1NiCrMoCu31-27-4	1.4563	P ^j	75	220	260	500 to 700	40	40	100	60	yes	yes
X1CrNiMoCuN20-18-7	1.4547	C	8	320	350	650 to 850	35	35	-	-	yes	yes
		H	13,5	300	340		40	40	100	60		
		P ^j	75	300	340		40	40	100	60		
X1NiCrMoCuN25-20-7	1.4529	P ^j	75	300	340	650 to 850	40	40	100	60	yes	yes
X2CrNiMnMoN25-18-6-5	1.4565	C	6	420	460	800 to 950	30	30	120	90	yes	yes
		H	10									
		P	40									

The solution treatment may be omitted if the conditions for hot working and subsequent cooling are such that the requirements for the mechanical properties of the product and the resistance to intergranular corrosion as defined in EN ISO 3651 – 2 are obtained.

^a C = cold rolled strip; H = hot rolled strip; P = hot rolled plate.

^b Only for guidance.

^c If, in the case of strip in rolling widths < 300 mm, longitudinal test pieces are taken, the minimum values shall be reduced as follows: proof strength - minus 15 MPa, elongation for constant gauge length - minus 5%; elongation for proportional gauge length - minus 2 %.

^d For continuously hot rolled products, 20 MPa higher minimum values of $R_{p0,2}$ and 10 MPa higher minimum values of $R_{p1,0}$ may be agreed at the time of enquiry and order.

^e The values apply for test pieces with a gauge length of 80 mm and a width of 20 mm; test pieces with a gauge length of 50 mm and a width of 12,5 mm may also be used.

^f The values apply for test pieces with a gauge length of $5,65 \sqrt{S_0}$.

^g When tested according to EN ISO 3651-2.

^h See NOTE to 6.4.

ⁱ For thicknesses above 75 mm, the mechanical properties may be agreed.

^j For stretcher levelled material, the minimum value may be 5 % lower.

^k Sensitization treatment of 15 min at 700 °C followed by cooling in air.

^{*)} 1 MPa = 1N/mm².

Table 11 — Mechanical properties at room temperature of austenitic-ferritic steels in the solution annealed condition (see Table A.5) and resistance to intergranular corrosion

Steel designation		Product form ^a	Thickness	0,2%-proof strength $R_{p0,2}$	Tensile strength R_m	Elongation after fracture		Impact energy (ISO-V) KV > 10 mm thick		Resistance to intergranular corrosion ^f	
Name	Number					A_{80} < 3 mm thick ^d	A ≥ 3 mm thick ^e	J min. (long. + tr.)	J min. (tr.)	in the delivery condition	in the sensitized condition ^g
			mm max.	MPa ^j min. (tr.) ^{b,c}	MPa ^j	% min. (long. + tr.)	% min. (long. + tr.)				
Standard grades											
X2CrNiN23-4	1.4362	C	8	450	650 to 850	20	20	-	-	yes	yes
		H	13,5	400				100	60		
		P ^h	75	400	630 to 800	25	25				
X2CrNiMoN22-5-3	1.4462	C	8	500	700 to 950	20	20	-	-	yes	yes
		H	13,5	460				100	60		
		P ^h	75	460	640 to 840	25	25				
Special grades											
X2CrNiMoN29-7-2	1.4477	C	8	650	800 to 1050	20	20	-	-	yes	yes
		H	13,5	550	750 to 1000	20	20	100	60		
		P ^h	75	550							
X2CrNiMoN25-7-4	1.4410	C	8	550	750 to 1000	20	20	-	-	yes	yes
		H	13,5	530			100	60			
		P ^h	75	530	730 to 930	20	20				
X2CrNiMoSi18-5-3	1.4424	C	8	450	700 to 900	25	25	100	60	yes	yes
		H	13,5								
		P ^h	75	400	680 to 900						
X2CrMnNiN21-5-1	1.4162	C	6,4	530	700 to 900	20	30	-	-	yes	yes
		H	10	480	680 to 900	30	30	60	40		
		P ^h	75	450	650 to 850	30	30	60	40		
^a C = cold rolled strip; H = hot rolled strip; P = hot rolled plate. ^b If, in the case of strip in rolling widths < 300 mm, longitudinal test pieces are taken, the minimum proof strength values shall be reduced by 15 MPa. ^c For continuously hot rolled products, 20 MPa higher minimum values of $R_{p0,2}$ may be agreed at the time of enquiry and order. ^d The values shall apply for test pieces with a gauge length of 80 mm and a width of 20 mm; test pieces with a gauge length of 50 mm and a width of 12,5 mm may also be used. ^e The values shall apply for test pieces with a gauge length of $5,65 \sqrt{S_0}$. ^f When tested according to EN ISO 3651-2. ^g See NOTE to 6.4. ^h For thicknesses above 75 mm, the mechanical properties may be agreed. ^j 1 MPa = 1 N/mm ² .											

Table 12 — Minimum values for the 0,2 %-and 1 %-proof strength of austenitic steels at elevated temperatures

Steel designation Name	Number	Heat treatment condition ^a	Minimum 0,2 %-proof strength, MPa ¹⁾										Minimum 1 %-proof strength, MPa ¹⁾									
			at a temperature (in °C) of																			
			100	150	200	250	300	350	400	450	500	550	100	150	200	250	300	350	400	450	500	550
Standard grades																						
X2CrNiN18-7	1.4318	+AT	265	200	185	180	170	165	-	-	-	-	300	235	215	210	200	195	-	-	-	-
X2CrNi18-9	1.4307	+AT	147	132	118	108	100	94	89	85	81	80	181	162	147	137	127	121	116	112	109	108
X2CrNi19-11	1.4306	+AT	147	132	118	108	100	94	89	85	81	80	181	162	147	137	127	121	116	112	109	108
X2CrNi18-10	1.4311	+AT	205	175	157	145	136	130	125	121	119	118	240	210	187	175	167	161	156	152	149	147
X5CrNi18-10	1.4301	+AT	157	142	127	118	110	104	98	95	92	90	191	172	157	145	135	129	125	122	120	120
X6CrNiTi18-10	1.4541	+AT	176	167	157	147	136	130	125	121	119	118	208	196	186	177	167	161	156	152	149	147
X2CrNiMo17-12-2	1.4404	+AT	166	152	137	127	118	113	108	103	100	98	199	181	167	157	145	139	135	130	128	127
X2CrNiMoN17-11-2	1.4406	+AT	211	185	167	155	145	140	135	131	128	127	246	218	198	183	175	169	164	160	158	157
X5CrNiMo17-12-2	1.4401	+AT	177	162	147	137	127	120	115	112	110	108	211	191	177	167	156	150	144	141	139	137
X6CrNiMoTi17-12-2	1.4571	+AT	185	177	167	157	145	140	135	131	129	127	218	206	196	186	175	169	164	160	158	157
X2CrNiMo17-12-3	1.4432	+AT	166	152	137	127	118	113	108	103	100	98	199	181	167	157	145	139	135	130	128	127
X2CrNiMo18-14-3	1.4435	+AT	165	150	137	127	119	113	108	103	100	98	200	180	165	153	145	139	135	130	128	127
X2CrNiMoN17-13-5	1.4439	+AT	225	200	185	175	165	155	150	-	-	-	255	230	210	200	190	180	175	-	-	-
X1NiCrMoCu25-20-5	1.4539	+AT	205	190	175	160	145	135	125	115	110	105	235	220	205	190	175	165	155	145	140	135
Special grades																						
X1CrNi25-21	1.4335	+AT	150	140	130	120	115	110	105	-	-	-	180	170	160	150	140	135	130	-	-	-
X1CrNiMoN25-22-2	1.4466	+AT	195	170	160	150	140	135	-	-	-	-	225	205	190	180	170	165	-	-	-	-
X2CrNiMoN17-13-3	1.4429	+AT	211	185	167	155	145	140	135	131	129	127	246	218	198	183	175	169	164	160	158	157
X3CrNiMo17-13-3	1.4436	+AT	177	162	147	137	127	120	115	112	110	108	211	191	177	167	156	150	144	141	139	137
X2CrNiMo18-15-4	1.4438	+AT	172	157	147	137	127	120	115	112	110	108	206	188	177	167	156	148	144	140	138	136
X12CrMnNiN17-7-5	1.4372	+AT	295	260	230	220	205	185	-	-	-	-	325	295	265	250	230	205	-	-	-	-
X1NiCrMoCu31-27-4	1.4563	+AT	190	175	160	155	150	145	135	125	120	115	220	205	190	185	180	175	165	155	150	145
X1CrNiMoCuN20-18-7	1.4547	+AT	230	205	190	180	170	165	160	153	148	-	270	245	225	212	200	195	190	184	180	-
X1CrNiMoCuN25-20-7	1.4529	+AT	230	210	190	180	170	165	160	-	-	-	270	245	225	215	205	195	190	-	-	-
X2CrNiMnMoN25-18-6-5	1.4565	+AT	350	310	270	255	240	225	210	210	210	200	400	355	310	290	270	255	240	240	240	230
^a +AT = solution annealed.																						
¹⁾ 1 MPa = 1 N/mm ² .																						

Table 13 — Tensile strength levels in the cold worked condition (process route 2H)

Symbol	Tensile strength ^{a,b} MPa ^{c)}
+C700	700 to 850
+C850	850 to 1000
+C1000	1000 to 1150
^a Intermediate tensile strength values may be agreed. Alternatively, the steels may be specified in terms of minimum 0,2 %-proof strength (see Tables 14 and 16) or hardness, but only one parameter may be specified in the order.	
^b The maximum product thickness for each tensile strength level decreases with the tensile strength. The maximum product thickness and remaining elongation are also dependent on the work hardening behaviour of the steel and the cold working conditions. Consequently, more exact information may be requested from the manufacturer.	
^{c)} 1 MPa = 1 N/mm ² .	

Table 14 — 0,2 %-proof strength levels in the cold worked condition (process route 2H)

Symbol	0,2 %-proof strength ^{a,b} MPa ^{c)}
+CP350	350 to 500
+CP500	500 to 700
+CP700	700 to 900
^a Intermediate proof strength values may be agreed.	
^b The maximum product thickness for each proof strength level decreases with the proof strength.	
^{c)} 1 MPa = 1 N/mm ² .	

Table 15 — Available tensile strength levels of steel grades in the cold worked condition
(process route 2H)

Steel designation		Available tensile strength level		
Name	Number	+C700	+C850	+C1000
Standard grades				
X2CrNi18-7	1.4318	-	X	X
X5CrNi18-10	1.4301	X	X	X
X6CrNiTi18-10	1.4541	X	X	-
X5CrNiMo17-12-2	1.4401	X	X	-
X6CrNiMoTi17-12-2	1.4571	X	X	-
Special grade				
X12CrMnNi17-7-5	1.4372	-	X	X

Table 16 — Available 0,2 %-proof strength levels of steel grades in the cold worked condition
(process route 2H)

Steel designation		Available 0,2 %-proof strength level		
Name	Number	+CP350	+CP500	+CP700
Standard grades				
X2CrNi18-7	1.4318	-	X	X
X5CrNi18-10	1.4301	X	X	X
X6CrNiTi18-10	1.4541	X	X	-
X5CrNiMo17-12-2	1.4401	X	X	-
X6CrNiMoTi17-12-2	1.4571	X	X	-
Special grade				
X12CrMnNi17-7-5	1.4372	-	X	X

Table 17 — Tests to be carried out, test units and extent of testing in specific testing

Test	a	Test unit	Strip and sheet cut from strip (C, H) in rolling width		Product form Rolled plate (P)	Number of test pieces per test sample
			< 600 mm	≥ 600 mm		
Chemical analysis	m	Cast	The cast analysis is given by the manufacturer. ^b			
Tensile test at room temperature	m	Same cast, same nominal thickness ± 10 %, same final treatment condition (i.e. same heat treatment and/or same degree of cold deformation)	The extent of testing shall be agreed at the time of ordering	1 test sample from each coil	a) Plates processed under identical conditions may be collected into a batch with a maximum total weight of 30000 kg comprising no more than 40 plates. One test sample per batch shall be taken from heat treated plates up to 15 m in length. One test sample shall be taken from each end of the longest plate in the batch where heat treated plates are longer than 15 m. b) If the plate cannot be tested in batches, one test sample shall be taken from one end from heat treated plates up to 15 m long and one test sample shall be taken from each end of heat treated plates longer than 15 m.	1
Tensile test at elevated temperature	o		To be agreed at the time of ordering (see Table 12).			1
Impact test at room temperature	o		To be agreed at the time of ordering (see Tables 8, 10 and 11).			3
Resistance to intergranular corrosion	o		To be agreed at the time of ordering if intergranular corrosion is a hazard (see Tables 7, 10 and 11).			1
NOTE 1 For austenitic steels, the impact test is normally not carried out (see NOTE in 6.5.1).						
NOTE 2 The test for resistance to intergranular corrosion is normally not carried out.						
^a Tests marked with a "m" shall be carried out as specific tests in all cases. Those marked with an "o" (optional) shall be carried out as specific tests only if agreed at the time of enquiry and order.						
^b A product analysis may be agreed at the time of enquiry and order; the extent of testing shall be specified at the same time.						

Table 18 – Minimum frequency of testing for product testing and evaluation as part of FPC

Property	Clause indicating the relevant test method (if any)	Threshold value (if any) and tolerances	Minimum number of samples	Minimum frequency of tests
Tolerances on dimension and shape	Annex B	Yes	1 per product form and nominal dimension	1 per sample
Elongation	7.4.2	Yes	1 per cast, product form, dimensional range (tables for mechanical properties), heat treatment batch	1 per sample
Tensile strength	7.4.2			
Yield strength	7.4.2			
Impact strength	7.4.2	yes	1 per cast, product form, dimensional range (tables for mechanical properties), heat treatment batch	3 per sample
Weldability [covered by chemical composition]	7.4.1	yes	1 per cast	1 per cast
Durability [covered by chemical composition]	7.4.1	yes	1 per cast	1 per cast

Table 19 — Marking of the products

Marking of	Products with specific testing ^a
Manufacturer's name, trade mark or logo	+
The number of this European Standard	(+)
Steel number or name	+
Type of finish	(+)
Cast number	+
Identification number ^b	+
Direction of rolling	(+)
Nominal thickness	(+)
Nominal dimensions other than thickness	(+)
Inspector's mark	(+)
Customer's order No.	(+)
NOTE The direction of rolling is normally obvious from the shape of the product and the position of the marking. Marking may either be longitudinally applied by roller stamping or it may be near to one end of the piece and transverse to the rolling direction. A specific separate indication of the principal rolling direction will not normally be required, but may be requested by the customer.	
^a The symbols in the table mean: + = the marking shall be applied; (+) = the marking shall be applied if so agreed, or at the manufacturer's discretion.	
^b The numbers or letters used for identification shall allow the product(s) to be related to the relevant inspection certificate.	

Annex A
(informative)

Guidelines for further treatment (including heat treatment) in fabrication

- A.1** The guidelines given in Tables A.1 to A.5 are intended for hot forming and heat treatment.
- A.2** Flame cutting can adversely affect edge areas; where necessary, they should be machined.
- A.3** As the corrosion resistance of stainless steels is only ensured with a metallically clean surface, layers of scale and annealing colours produced during hot forming, heat treatment or welding should be removed as far as possible before use. Finished parts made of steels with approximately 13 % Cr also require the best surface condition (e.g. polished) in order to achieve maximum resistance to corrosion.

Table A.1 — Guidelines on the temperatures for hot forming and heat treatment of ferritic corrosion resisting steels

Steel designation		Hot forming		Heat treatment symbol	Annealing	
Name	Number	Temperature °C	Type of cooling		Temperature ^a °C	Type of cooling
Standard grades						
X2CrNi12	1.4003	1100 to 800	air	+A	700 to 760	air, water
X2CrTi12	1.4512				770 to 830	
X6Cr17	1.4016				770 to 830	
X3CrTi17	1.4510				770 to 830	
X2CrMoTi18-2	1.4521				820 to 880	
Special grades						
X2CrMoTi17-1	1.4513	1100 to 800	air	+A	820 to 880	air, water
X6CrMoNb17-1	1.4526				800 to 860	
X2CrTiNb18	1.4509				870 to 930	
NOTE The temperature of annealing should be agreed for simulated heat-treated test-pieces.						
^a If heat-treatment is carried out in a continuous furnace, the upper part of the range specified should usually be preferred, or even exceeded.						

Table A.2 — Guidelines on the temperatures for hot forming and heat treatment of martensitic corrosion resisting steels

Steel designation		Hot forming		Heat treatment symbol	Annealing		Quenching		Tempering
Name	Number	Temperature °C	Type of cooling		Temperature ^a °C	Type of cooling	Temperature ^a °C	Type of cooling	Temperature °C
X12Cr13	1.4006	1100 to 800	air	+A	750 to 810	-	-	-	-
				+QT550	-	-	950 to 1010	oil, air	700 to 780
				+QT650	-	-			620 to 700
X20Cr13	1.4021		slow cooling	+A	730 to 790	-	-	-	-
				+QT	-	-	950 to 1050	Oil, air	200 to 350
				+QT650	-	-	950 to 1010		700 to 780
				+QT750	-	-			620 to 700
X4CrNiMo16-5-1	1.4418	1150 to 900	air	+QT840	-	-	900 to 1000	oil, air, water	570 to 650
NOTE The temperatures of annealing, quenching and tempering should be agreed for simulated heat-treated test pieces.									
^a If heat treatment is carried out in a continuous furnace, the upper part of the range specified should usually be preferred, or even exceeded.									

Table A.3 — Guidelines on the temperatures for hot forming and heat treatment of precipitation hardening corrosion resisting steels

Steel designation		Hot forming		Heat treatment symbol	Stress relieving		Solution annealing		Precipitation hardening		
Name	Number	Temperature °C	Type of cooling		Temperature °C	Type of cooling	Temperature °C	Type of cooling	Temperature °C		
Special grade											
X5CrNiCuNb16-4	1.4542	1150 to 900	air	+AT	-	-	1025 to 1055	air	-		
				+P850	-	-	1025 to 1055	air	4 h (610 to 630)		
				+P900	-	-			1 h (590 to 610)		
				+P950	-	-			1 h (580 to 600)		
				+P1070	-	-			1 h (540 to 560)		
				+P1300	-	-			1 h (470 to 490)		
				+SR630	≥ 4 h (600 to 660) ^b	-	-	-	-		
X7CrNiAl17-7	1.4568			+AT	-	-	1030 to 1050	air	-		
				+P1450	-	-	10 min 945 to 965	^c	1 h (500 to 520)		
NOTE The temperatures of solution annealing should be agreed for simulated heat-treated test pieces.											
^a If heat treatment is carried out in a continuous furnace, the upper part of the range specified should usually be preferred, or even exceeded.											
^b After martensitic transformation. Solution annealing at 1025 to 1055 °C will be necessary before precipitation hardening.											
^c Quick cooling to ≤ 20 °C; cooling within 1 h to -70 °C; holding time 8 h; reheating in air to +20 °C.											

Table A.4 — Guidelines on the temperatures for hot forming and heat treatment of austenitic corrosion resisting steels

Steel designation		Hot forming		Heat treatment symbol	Solution annealing		of			
Name	Number	Temperature °C	Type of cooling		Temperature ^{a, b, c} °C	Type cooling				
Standard grades										
X2CrNiN18-7	1.4318	1150 to 850	air	+AT	1020 to 1100	water, air ^d				
X2CrNi18-9	1.4307				1000 to 1100					
X2CrNi19-11	1.4306				1000 to 1100					
X2CrNiN18-10	1.4311				1000 to 1100					
X5CrNi18-10	1.4301				1000 to 1100					
X6CrNiTi18-10	1.4541				1000 to 1100					
X2CrNiMo17-12-2	1.4404				1030 to 1110					
X2CrNiMoN17-11-2	1.4406				1030 to 1110					
X5CrNiMo17-12-2	1.4401				1030 to 1110					
X6CrNiMoTi17-12-2	1.4571				1030 to 1110					
X2CrNiMo17-12-3	1.4432				1030 to 1110					
X2CrNiMo18-14-3	1.4435				1030 to 1110					
X2CrNiMoN17-13-5	1.4439				1060 to 1140					
X1NiCrMoCu25-20-5	1.4539				1060 to 1140					
Special grades										
X1CrNi25-21	1.4335	1150 to 850	air	+AT	1030 to 1110	water, air ^d				
X1CrNiMoN25-22-2	1.4466				1070 to 1150					
X2CrNiMoN17-13-3	1.4429				1030 to 1110					
X3CrNiMo17-13-3	1.4436				1030 to 1110					
X2CrNiMo18-15-4	1.4438	1070 to 1150								
X12CrMnNiN17-7-5	1.4372	1000 to 1100								
X1NiCrMoCu31-27-4	1.4563	1070 to 1150								
X1CrNiMoCuN20-18-7	1.4547	1150 to 1200								
X1NiCrMoCuN25-20-7	1.4529	1120 to 1180								
X2CrNiMnMoN25-18-6-5	1.4565	1120 to 1170								
NOTE The temperatures of solution annealing should be agreed for simulated heat-treated test pieces.										
^a The solution annealing may be omitted if the conditions for hot working and subsequent cooling are such that the requirements for the mechanical properties of the product and the resistance to intergranular corrosion as defined in EN ISO 3651-2 are obtained.										
^b If heat treatment is carried out in a continuous furnace, the upper part of the range specified should usually be preferred, or even exceeded.										
^c The lower end of the range specified for solution annealing should be aimed at the heat treatment as part of further processing, because otherwise the mechanical properties might be affected. If the temperature of hot forming does not drop below the lower temperature for solution annealing, a temperature of 980°C is adequate as a lower limit for Mo-free steels, a temperature of 1000°C for steels with Mo contents up to 3 % and a temperature of 1020°C for steels with Mo contents exceeding 3 %.										
^d Cooling sufficiently rapidly in order to avoid the occurrence of intergranular corrosion as defined in EN ISO 3651-2.										

Table A.5 — Guidelines on the temperatures for hot forming and heat treatment of austenitic-ferritic corrosion resisting steels

Steel designation		Hot forming		Heat treatment symbol	Solution annealing	
Name	Number	Temperature °C	Type of cooling		Temperature ^a °C	Type of cooling
Standard grades						
X2CrNiN23-4	1.4362	1150 to 950	air	+AT	950 to 1050	water, air ^b
X2CrNiMoN22-5-3	1.4462				1020 to 1100	
Special grades						
X2CrNiMoN29-7-2	1.4477	1150	air	+AT	1040 to 1120	water, air ^b
X2CrNiMoN25-7-4	1.4410	to				
X2CrNiMoSi18-5-3	1.4424	1000			1000 to 1100	
X2CrMnNiN21-5-1	1.4162	1100 to 900			1020 to 1080	
NOTE The temperatures of solution annealing should be agreed for simulated heat-treated test pieces.						
^a If heat treatment is carried out in a continuous furnace, the upper part of the range specified should usually be preferred or even exceeded.						
^b Cooling sufficiently rapidly in order to avoid precipitation.						