

Materials



Cast

GG: Grey cast iron with lamellar graphite

			Main alloying constituents in %											
Designation	DIN EN	USA	C	Si	Mn	Cr	Mo	Ni	Cu	N	Fe	Other	Hardness	Yield strength Rp0.2 (20°C)
GG 20	0.6020	ASTM A48 (30B)	3.4	2.0	0.35				0.5		Rest		150-230 HB	200 N / mm2
GG 25	0.6025	ASTM A48 (40B)	2.0 - 4.0	1.8 - 2.1	0.6 - 0.8						Rest	P <0.1 S <0.08	180-250 HB	250 N / mm2

For general applications without any corrosion or abrasion requirement.

GGG: Spheroidal cast iron with spheroidal graphite

			Main alloying constituents in %											
Designation	DIN EN	USA	C	Si	Mn	Cr	Mo	Ni	Cu	N	Fe	Other	Hardness	Yield strength Rp0.2 (20°C)
GGG 40	0.7040	ASTM A536 (60-40-18)	3.8	2.5	<0.1						Rest		120-180 HB	250 N / mm2
GGG 50	0.7050	ASTM A536 (60-45-12)	3.4	2.7	<0.1			1.8			Rest		170-240 HB	320 N / mm2

For general applications without any corrosion or abrasion requirement.

Hard Iron HG

			Main alloying constituents in %											
Designation	DIN EN	USA	C	Si	Mn	Cr	Mo	Ni	Cu	N	Fe	Other	Hardness	Yield strength Rp0.2 (20°C)
HG 15.3	G-X-300 CrMo 15 3		2.4 - 2.8	<1.0	0.5 - 1.5	14 - 18	1.0 - 3.0	<0.4	<1.2	<0.2	Rest		55-65 HRC (Hardened)	No longer ductile
HG 25.3	G-X-150 Cr25		1.64 - 1.70	0.5 - 0.7	0.5 - 0.7	24 - 26	<3.0	<0.4		<0.2	Rest	V 0.15 - 0.2	55-60 HRC (Hardened)	
ASTM A532IIIA (25%Cr)		ASTM A532IIIA	2.3 - 3.3	<1.5	<2.0	23 - 30 (25)	<3.0	<2.5	<1.2	-	Rest	S <0.06 P <0.1	55-60 HRC (Hardened)	

Extremely abrasion resistant material. For wastewater and slurries containing lots of sand.

With 25% chromium also resistant to weak acids and weak lyes.

Stainless steels

Steel castings with at least 13% chromium content are designated as non-rusting stainless steels or Inox.

The alloy content, primarily chromium, nickel and molybdenum, form a thin passive layer on the surface which is responsible for the corrosion protection. The surface refreshes itself constantly through the presence of oxygen (air, water). The main component of stainless steel is always iron.



Stainless 1.4409 Austenitic

			Main alloying constituents in %											
Designation	DIN EN	USA	C	Si	Mn	Cr	Mo	Ni	Cu	N	Fe	Other	Hardness	Yield strength Rp0.2 (20°C)
1.4409	GX2CrNiMo 19-11-2	AISI 316 L	<0.03	<1.5	<2.0	18-20	2.0 - 2.5	9-12		<0.2	Rest		130-200 HB	140 - 195 N / mm2

Equivalent designations: A4, V4A, Inox, Nirosta
Resistant against weak acids and weak alkalis.
Increased resistance against intercrystalline corrosion. Resistant against fluids with low chloride content. Moderately wear-resistant.

Duplex-Stainless 1.4593 (Austenitic-Ferritic)

			Main alloying constituents in %											
Designation	DIN EN	USA	C	Si	Mn	Cr	Mo	Ni	Cu	N	Fe	Other	Hardness	Yield strength Rp0.2 (20°C)
1.4593	GX3CrNiMo-CuN24-6-2-3	AISI 329 ASTM A 890	<0.04	<1.5	<1.5	23-26	2.0 - 3.0	5-8	2.75 - 3.5	0.1 - 0.2	Rest		200-260 HB	450 N / mm2

Equivalent designation: CD4MCu
Resistant to a number of mixed acids and mixed alkalis. Increased resistance to stress corrosion cracking, especially from fluids containing chlorides. Moderate to good resistance to wear.

Highly corrosion-resistant stainless steel 1.4588 (Austenitic)

			Main alloying constituents in %											
Designation	DIN EN	USA	C	Si	Mn	Cr	Mo	Ni	Cu	N	Fe	Other	Hardness	Yield strength Rp0.2 (20°C)
1.4588	GX2NiCrMo-CuN25-20-6	ASTM A 743 (CK-3MCuN)	<0.025	<1.0	<2.0	19-21	6.0 - 7.0	24-26	0.5 - 1.5	0.1 - 0.25	Rest		Not specified	210 N / mm2

Resistant to a number of acids and alkalis. High resistance to stress corrosion cracking, especially from fluids containing chlorides. Moderately wear-resistant.

Nickel-based alloys

In contrast to stainless steels, nickel-based alloys have nickel as their main component. Iron is only present in small amounts. The element, nickel provides these materials with very high resistance to corrosion. Through the addition of other alloying elements, especially copper, chromium, molybdenum, and tungsten, specific properties can be achieved.



Hastelloy C-2000 / Hastelloy B3 (Nickel-based)

			Main alloying constituents in %											
Designation	DIN EN	USA	C	Si	Mn	Cr	Mo	Ni	Cu	N	Fe	Other	Hardness	Yield strength Rp0.2 (20°C)
Hastelloy C-2000	2.4675 NiCr23Mo-16Cu		<0.01	<0.08	<0.5	22-24	15-17	51-62	1.3 - 1.9		<3.0	Al <0.5 Co <2.0	205 HB	280-330 N / mm2
Hastelloy B3	2.4600 NiMo29Cr		<0.01	<0.1	<3.0	0.5 - 3.0	26-32	48-72	<0.5		1.0-6	Al <0.5 Co <3.0 W <3.0 V <0.2 Ti <0.2 Nb <0.4	140-200 HB	300 N / mm2

Hastelloy is suited for a variety of highly corrosive acids, depending on temperature and concentration. Hastelloy alloys are moderately wear-resistant. Hastelloy is a registered brand name. Inconel is a competing product with similar properties.

Monel 411 (Nickel-based)

			Main alloying constituents in %											
Designation	DIN EN	USA	C	Si	Mn	Cr	Mo	Ni	Cu	N	Fe	Other	Hardness	Yield strength Rp0.2 (20°C)
Monel 411	2.4365 G-NiCu30Nb	ASTM A 494 (M-30-C)	<0.15	0.5 - 1.5	0.5-1.5			62-68	26-33		1.0 - 2.0	Al <0.5 Co <1.0 Nb <1.0-1.5 P <0.01 S <0.01	>120 HB	220 N / mm2

Very often used with sea water and brines to a maximum of 120°C. Highly resistant to hydrofluoric acid (HF) over a wide temperature and concentration range. Moderate to poor wear resistance.

Nickel 210 (Nickel-based)

			Main alloying constituents in %											
Designation	DIN EN	USA	C	Si	Mn	Cr	Mo	Ni	Cu	N	Fe	Other	Hardness	Yield strength Rp0.2 (20°C)
Nickel 210	2.4170.01 G-Ni95	ASTM A 494 (CZ-100)	<1.0	<2.0	<1.5			>95	<1.2		<1.0	S <0.01	80 HB	120 N / mm2

Most important use is for sodium hydroxide (NaOH) and other alkalis. Moderately wear-resistant.