Description/ trade name	Material Code	Material no.	Chemical composition (reference analysis, MA %)								Standards	Comparable		Mechanical-technological properties (reference values)					Heat treatment	Micro-structure	Weldability	Comments
			C	Si	Mn	Cr	Ni	Mo	Cu	Other		ASTM	AFNOR	Hardness HV 50	0,2 Proof stress N/mm²	Tensile strength N/mm²	Elongation at fracture %	Notched bar impact work J(ISO–V)				
Types of cast iron and cast steel																						
Cast steel	GP240GH+N	1.0619+N	0,2	≤0,6	0,7						EN 10213–2	A 216 WCB			≥ 240	≥ 420	≥ 22	≥ 27	N	F + P	+	
Grey cast iron	GJL–250	JL 1040									EN 1561	A 48: 40B				≥250				P	(+)	Max. St.–G.4000 kg
Nodular cast iron	GJS–400–15	JS 1030									EN 1563	A 536: Cl. 60–40–18			≥ 250	≥ 400	≥ 15		–	(F)	(+)	
	GJS–400–18–LT	JS 1025									EN 1563	A 536, Gr. 60–40–18			≥ 250	≥ 400	≥ 18	≥ 12	G	F	(+)	
ERN	GGL–NiMo7–7	–	3,2	1,8	0,7		1,8	0,7			KSB–WSZ 1930			≥300 HV 50				–	–	B	–	
NORIHARD®NH 15 3	GX250CrMo15–3	–	2,6	0,6	0,7	15,0		2,6			KSB–WSZ 1941			750–1000 HV 50					V	M + C	–	Max. St.–G.1000 kg
NORILOY®NL 25 2	GX170CrMo25–2	–	1,7	≤1,0	≤1,0	25,0		2,0			KSB–WSZ 2878			≥500 HV 50		[3] 400			V	F + C	–	
NORICROM®	GX150CrNiMoCuN41–6–2	1.4475	1,5	≤1,0	≤1,0	40,5	6,0	2,5	≤1,2	N	KSB–WSZ 2711			≥500 HV 50		[3] 500			L	F + A + C	–	
Stainless and high-alloy cast steel																						
Cast chrome steel	GX7CrNiMo12–1	1.4008	≤0,10	≤1,0	≤1,0	13,0	1,5	≤0,5			EN 10283	A743 CA 15 A217		≥ 170 HB	≥ 440	≥ 590	≥ 15	≥ 27	V	M	+	
Martensitic cast steel	GX4CrNi13–4	1.4317	≤0,06	≤1,0	≤1,0	13,0	4,0	≤0,7			SEW 520	A743 CA 6 A487 NM	Z4CND 134-M	≥ 240 HB	≥ 550	≥ 760	≥ 15	≥ 50	V (I)	M	+	
Austenitic cast steel	GX5CrNiNb19–11	1.4552	≤0,07	≤1,5	≤1,5	19,0	10,0			Nb[1]8x%C	EN 10213	A743 A 351	CF8C	≥ 130 HB	≥ 175	≥ 440	≥ 25	≥ 40	L	A	+	KSB C ≤ 0,04
	GX5CrNiMoNb19–11–2	1.4581	≤0,07	≤1,5	≤1,5	19,0	11,5	2,3		Nb[1]8x%C	EN 10213			≥ 130 HB	≥ 185	≥ 440	≥ 25	≥ 40	L	A	+	
	GX5CrNi19–10	1.4308	≤0,07	≤1,5	≤1,5	19,0	10,0				EN 10213		CF8C	≥ 130 HB	≥ 175	≥ 440	≥ 30	≥ 60	L	A	+	KSB C ≤ 0,04
	GX5CrNiMo19–11–2	1.4408	≤0,07	≤1,5	≤1,5	19,0	11,0	2,3			EN 10213		CF8M	≥ 130 HB	≥ 185	≥ 440	≥ 30	≥ 60	L	A	+	
NORINOX®	GX3CrNiMo19–11–2	(1.4409)	≤0,04	≤1,5	≤1,5	19,0	11,0	2,3			KSB–WSZ 2715		(CF3M)	≥ 130 HB	≥ 120	≥ 470	≥ 30	≥120	L	A	+	
NORILIUM®	GX3NiCrMoCu25–20–5	(1.4539)	≤0,03	≤1,0	≤2,0	20,0	25,0	4,5	1,5	N	KSB–WSZ 2765			≥ 130 HB	≥ 180	≥ 440	≥ 20	≥ 60	L	A	+	
NORICID®	GX3CrNiSiN20–13–5	9.4306	≤0,04	4,5	4,5	20,0	13,0	≤0,2		N	KSB–WSZ 2872			≥ 200 HB	≥ 300	≥ 600	≥ 30	≥ 60	L	A(+F)	+	
NORIDUR®	GX3CrNiMoCuN24–6–2–3	1.4593	≤0,04	≤1,5	≤1,5	25,0	6,0	2,5	3,0	N	KSB–WSZ 2745	A 890 A 351–CD4MCu	Z3CNDU 26S–M	≥ 200 HB	≥ 450	≥ 650	≥ 23	≥ 60	L	F+A	+	SEW 410
NORICLOR®	GX3CrNiMoCuN24–6–5	1.4573	≤0,04	≤1,0	≤1,0	24,0	6,0	5,0	2,0	N	KSB–WSZ 2747	A 890 CE3MN		≥ 200 HB	≥ 480	≥ 690	≥ 22	≥ 50	L	F+A	+	SEW 410
Cast alloys based on copper																						
			Cu	Ni	Al	Sn	Fe	Si	Mn	Sons.		B 584, C 90 500		≥ 70 HB	≥ 130	≥ 250	≥ 18		–		+	
Tin bronze	CuSn10–C–GS	CC480K–GS	89,0	≤2,0		10,0	≤0,2			Pb ≤1,0;Zn≤0,5	EN 1982	B 148, C 95 500		≥ 140 HB	≥ 250	≥ 600	≥ 13		–		+	
Aluminium bronze	CuAl10Fe5Ni5–C–GS	CC333G–GS	376,0	5,2	10,0		4,5		≤3,0	Total < 0.8	EN 1982											

Heat treatments:
G = Annealed N = Normalised
V = Tempered P = Perlite

Microstructure:
F = Ferrite M = Martensite C = Carbide
A = Austenite B = Bainite L = Solution-annealed and quenched

Wear-resistant and corrosion-resistant
Wear-resistant
Corrosion resistant

Fig. 1 Materials: Metallic materials for centrifugal pumps

Fig. 2 Material: Reference values of plastics for centrifugal pumps

Chemical designation	Trade name	Code to DIN 7728	Density g/cm³	Tensile strength N/mm²	Elongation at break %	Tensile modulus of elasticity N/mm²	Impact viscosity kJ/m²	Continuous operating temperature Water °C	Continuous operating temperature Dry °C	Linear expansion coefficient at 20 °C 1/K	Water absorption/ retention % [5]	Special properties
Polyamide	Ultramid B3 WG 7	PAG - GF 35 [1]	1,40	130 [3]	6 [3]	7000 [3]	50	90	125	20-50 • 10^{-6}	6,2	Wear resistant, very ductile
Polyphenylene oxide	Noryl GFN 2	PPO - GF 20	1,21	90	2-3	6500	30	110	110	40 • 10^{-6}	0,14	Good resistance to hot water, minimal water absorption/retention, high rigidity
	Noryl GFN 3	PPO - GF 30	1,27	120	2-3	9000	30	120	120	30 • 10^{-6}	0,12	
Polyether sulphone	Victrex 4 01 GL 30	PES - GF 30	1,60	140	3	8000	27	140	180	23 • 10^{-6}	0,15	Very good resistance to hot water, minimal water absorption/retention, excellent dimensional stability in high temperatures
Polybutylene terephthalate	Pocan 3235	PBTP - GF 30	1,55	130	2,7	10500	45	60	120	30 • 10^{-6}	0,3	High rigidity, good friction and abrasion behaviour
Polycarbonate	Makrolon 8030	PC - GF 30	1,44	90	3,5	5500	30	60	120	27 • 10^{-6}	0,3	Wear resistant, minimal water absorption/retention, low warpage
Acrylic nitrite-styrene-acrylic ester	Luran 776 S	ASA	1,07	47	20	2300	No fracture	60	85	90 • 10^{-6}	0,45	Excellent weather resistance, high impact viscosity
Polypropylene	Hostalen PPNVP 7180 TV/20	PP - TV 20 [2]	1,04	33	20	2300 [4]	38	60	100	80-150 • 10^{-6}	0,2	Good resistance to chemicals, good surface lustre, scratch-resistant surface
	Hostalen PPNVP 7780 GV/20	PP - GF 20	1,05	32	50	2400 [4]	50	60	100	60-170 • 10^{-6}	0,2	
	Hostalen PPNVP 7790 GV/2/30	PP - GF 30	1,14	71	5	5500 [4]	15	70	110	70 • 10^{-6}	0,2	Good resistance to chemicals, high rigidity
Soft polyethylene	Lupolen 1810 H	LDPE	0,92	9	>400	230	No fracture	60	80	230 • 10^{-6}	0,2	High flexibility, good resistance to chemicals

[1] GF 35: 35 weight % glass fibre
[2] TV 20: 20 weight % talc
[3] Humidity (storage in standard conditioning atmosphere up to saturation of approx. 1 % water)
[4] Flexural modulus of elasticity
[5] For storage in water at 23 °C