Grey Cast Irons

Technical Data

Grey Cast Irons	Standard	Material designation			
	BS EN 1561 -1997	EN-GJL-200 (EN-JL1030)	EN-GJL-250 (EN-JL1040)	EN-GJL-300 (EN-JL1050)	EN-GJL-350 (EN-JL1060)
Characteristic	SI unit				
Tensile strength R_m	N/mm^2	200-300	250-350	300-400	350-450
0,1 % proof stress $R_{p0,1}$	N/mm^2	130-195	165-228	195-260	228-285
Elongation A	%	0,8 to 0,3	0,8 to 0,3	0,8 to 0,3	0,8 to 0,3
Compression strength σbB	N/mm^2	720	840	960	1080
0,1 % compression yield point $\sigma d0,1$	N/mm^2	260	325	390	455
Bending strength σbB	N/mm^2	290	340	390	490
Shear strength σaB	N/mm^2	230	290	345	400
Torsional strength τtB	N/mm^2	230	290	345	400
Modulus of elasticity E	kN/mm^2	88-113	103-118	108-137	123 to 143
Poisson's ratio ν	-	0,26	0,26	0,26	0,26
Bending fatigue strength σbW	N/mm^2	90	120	140	145
Fatigue limit under reversed tension-compression stresses σzdW	N/mm^2	50	60	75	85
Fracture toughness K_{1c}	$N/mm^{3/2}$	400	480	560	650
Density ρ	g/cm^3	7,15	7,20	7,25	7,3
Specific heat capacity c	J/(kg.K)				
between 20°C and 200°C		460	460	460	460
between 20°C and 600°C		535	535	535	535
Linear expansion coefficient α	mm/(m.K)				
between -100°C and +20°C		10,0	10,0	10,0	10,0
between 20°C and 200°C		11,7	11,7	11,7	11,7
between 20°C and 400°C		13,0	13,0	13,0	13,0
Thermal conductivity λ	W/(m.K)				
at 100°C		50,0	48,5	47,5	45,5
at 200°C		49,0	47,5	46,0	44,5
at 300°C		48,0	46,5	45,0	43,5
at 400°C		47,0	45,0	44,0	42,0
at 500°C		46,0	44,5	43,0	41,5
Resistivity ρ	$\Omega. mm^2/m$	0,77	0,73	0,70	0,67
Coercivity H_0	A/m	560 to 720	560 to 720	560 to 720	560 to 720
Maximum permeability μ	$\mu H/m$	220 to 330	220 to 330	220 to 330	220 to 330
Hysteresis losses at B = 1T	J/m^3	2500 to 3000	2500 to 3000	2500 to 3000	2500 to 3000

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Austenitic Cast Irons

Technical Data

Grade	Material designation		Tensile Strength	Compression Strength	0.2% Proof Stress	Elongation	Charpy V impact resistance value	Modulus of elasticity	Brinell hardness
	Symbol	Number	Rm	RD	RpQ,2	A		E	
			N/mm²	N/mm²	N/mm²	%	J	kN/mm²	HB
Engineering	EN-GJLA-XNiCuCr15-6-	EN-JL3011	170 - 210	700 - 840	———	2	———	85 - 105	120 - 215
	EN-GJSA-XNiCr20-2	EN-JS3011	370 - 480	700 - 840	210 - 250	7 - 20	11 - 24	112 - 130	140 - 255
	EN-GJSA-XNiMn23-4	EN-JS3021	440 - 480	700 - 840	210 - 240	25 - 45	20 - 30	120 - 140	150 - 180
	EN-GJSA-XNiCrNb20-2	EN-JS3031	370 - 480	700 - 840	210 - 250	8 - 20	11 - 24	112 - 130	140 - 200
	EN-GJSA-XNi22	EN-JS3041	370 - 450	700 - 840	170 - 250	20 - 40	17 - 29	85 - 112	130 - 170
	EN-GJSA-XNi35	EN-JS3051	370 - 420	700 - 840	210 - 240	20 - 40	18	112 - 140	130 - 180
	EN-GJSA-XNiSiCr35-5-2	EN-JS3061	380 - 500	700 - 840	210 - 270	10 - 20	7 - 12	130 - 150	130 - 170
Special Purpose	EN-GJLA-XNiMn13-7	EN-JL3021	140 - 220	630 - 840	———	———	———	70 - 90	120 - 150
	EN-GJSA-XNiMn13-7	EN-JS3071	390 - 470	630 - 840	210 - 260	15 - 18	15 - 18	140 - 150	120 - 150
	EN-GJSA-XNiCr30-3	EN-JS3081	370 - 480	630 - 840	210 - 260	7 - 18	5	92 - 105	140 - 200
	EN-GJSA-XNiSiCr30-5-5	EN-JS3091	390 - 500	630 - 840	240 - 310	1 - 4	1 - 3	90	170 - 250
	EN-GJSA-XNiCr35-3	EN-JS3101	370 - 450	630 - 840	210 - 290	7 - 10	4	112 - 123	140 - 190

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Abrasion Resistant Cast Irons

Technical Data

Material Designation		Vickers	Brinell	Rockwell	Chemical composition % (mass fraction)						
Symbol	Number	Hardness Min	Min	HRC Min	C	Si	Mn	P	S	Ni	Cr
EN-GJN-HV350	EN-JN2019	350	340	34	2,4 - 3,9	0,4 - 1,5	0,2 - 1,0	———	———	———	max. 2,0
EN-GJN-HV520	EN-JN2029	520	480	48	2,5 - 3,0	max, 0,8	max, 0,8	max, 0,10	max, 0,10	3,0 - 5,5	1,5 - 3,0
EN-GJN-HV550	EN-JN2039	550	510	50	3,0 - 3,6	max, 0,8	max, 0,8	max, 0,10	max, 0,10	3,0 - 5,5	1,5 - 3,0
EN-GJN-HV600	EN-JN2049	600	555	53	2,5 - 3,5	1,5 - 2,5	0,3 - 0,8	max, 0,08	max, 0,08	4,5 - 6,5	8,0 - 10,0

Material Designation		Chemical composition in % (mass fraction)									Vickers hardness
Symbol	Number	C	Si max.	Mn	P max.	S max.	Cr	Ni max.	Mo max.	Cu max.	HV min.
EN-GJN-HV600(XCr11)	EN-JN3019	>1,8 - 2,4 >2,4 - 3,2 >3,2 - 3,6	1,0	0,5 - 1,5	0,08	0,08	11,0 - 14,0	2,0	3,0	1,2	600
EN-GJN-HV600(XCr14)	EN-JN3029	>1,8 - 2,4 >2,4 - 3,2 >3,2 - 3,6	1,0	0,5 - 1,5	0,08	0,08	14,0 - 18,0	2,0	3,0	1,2	600
EN-GJN-HV600(XCr18)	EN-JN3039	>1,8 - 2,4 >2,4 - 3,2 >3,2 - 3,6	1,0	0,5 - 1,5	0,08	0,08	18,0 - 23,0	2,0	3,0	1,2	600
EN-GJN-HV600(XCr23)	EN-JN3049	>1,8 - 2,4 >2,4 - 3,2 >3,2 - 3,6	1,0	0,5 - 1,5	0,08	0,08	23,0 - 28,0	2,0	3,0	1,2	600

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Spheroidal Graphite Cast Irons

Technical Data

Spheroidal Graphite Cast Irons	Standard	Material designation			
	BS EN 1563 (1997)	EN-GJS-400-15 (EN-JS1030)	EN-GJS-450-10 (EN-JS1040)	EN-GJS-500-7 (EN-JS1050)	EN-GJS-600-3 (EN-JS1060)
Characteristic	SI unit				
Tensile strength R_m (min)	N/mm^2	400	450	500	600
0,2 % proof stress $R_{p0,2}$ (min)	N/mm^2	250	310	320	370
Elongation A (min)	%	15	10	7	3
Brinell hardness (typical)	HB	max 201	160/221	170/241	192/269
Impact resistance values (min) at (-40 ± 2) °C at (-20 ± 2) °C	 J J	not specified			
Compression strength σ_{db}	N/mm^2	700	700	800	870
Shear strength σ_{aB}	N/mm^2	360	405	450	540
Torsional strength τ_{tB}	N/mm^2	360	405	450	540
Modulus of elasticity E (tension and compression)	GN/m^2 (kN/mm^2)	169	169	169	174
Poisson's ratio ν	-	0,275	0,275	0,275	0,275
Fatigue limit (Wöhler) (rotating bending) unnotched (dia 10,6 mm)	N/mm^2	195	210	224	248
Fatigue limit (Wöhler) (rotating bending) notched (dia 10,6 mm)	N/mm^2	122	128	134	149
Fracture toughness K_{1c}	Mpa $\sqrt{m}^{1/2}$	30	23	25	20
Density ρ	g/cm^3	7,1	7,1	7,1	7,2
Specific heat capacity c between 20°C and 500°C	J/(kg.K)	515	515	515	515
Linear expansion coefficient α between 20°C and 400°C	µm/(m.K)	12,5	12,5	12,5	12,5
Thermal conductivity λ at 300°C	W/(m.K)	36,2	36,2	35,2	32,5
Resistivity ρ	µΩ.m	0,50	0,50	0,51	0,53
Maximum permeability μ	µH/m	2136	2136	1596	866
Hysteresis losses at B = 1T	J/m^3	600	600	1345	2248

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