

SAND CASTINGS

- **TECHNICAL AND
PHYSICAL PROPERTIES**

GENERAL TABLE OF FOUNDRY PRODUCED CAST IRON

LAMELLAR GRAPHITE CAST IRON

UNI EN 1561

Cst Iron Type	Determinant Wall-Thickness (mm)		Traction Strenght Rm. Obligatory Values on Specimen		Ttraction Strenght Rm Predictable Values	Brinell Hardness Classification HB		
	> than	≤ than	Separate Castings N/mm ²	Jet castings N/mm ²	N/mm ² (minimum values)	Symbolic Nomination	min.	max.
EN-GJL-250	5	10	DA 250 A 350	-	250	EN-GJL-HB215	200	275
	10	20		-	225		180	255
	20	40		210	195		160	235
	40	80		190	170		145	215
	80	150		170	155			
	150	300		160	-			
EN-GJL-300	10	20	DA 300 A 400	-	270	EN-GJL-HB235	200	275
	20	40		250	240		180	255
	40	80		220	210		165	235
	80	150		210	195			
	150	300		190	-			
EN-GJL-350	10	20	DA 350 A 450	-	315	EN-GJL-HB255		
	20	40		290	280		200	275
	40	80		160	250		185	255
	80	150		230	225			
	150	300		210	-			

NODULAR GRAPHITE CAST IRON

UNI EN 1563

Cast Iron Type	Traction Strenght Rm N/mm ² min.	Yeld Point Rp _{0,2} N/mm ² min.	Elongation	Brinell Hardness		Structure
	Rm N/mm ² min.	Rp _{0,2} N/mm ² min.	A % min.	Symbolic Nomination	HB	
EN-GJS-400-18	400	250	18	EN-GJS-HB150	DA 130 A 175	Ferrite
EN-GJS-400-15	400	250	15	EN-GJS-HB155	DA 135 A 180	Ferrite
EN-GJS-450-10	450	310	10	EN-GJS-HB185	DA 160 A 210	Ferrite
EN-GJS-500-7	500	320	7	EN-GJS-HB200	DA 170 A 230	Ferrite + Perlite
EN-GJS-600-3	600	370	3	EN-GJS-HB230	DA 190 A 270	Perlite + Ferrite
EN-GJS-700-2	700	420	2	EN-GJS-HB265	DA 225 A 305	Perlite
EN-GJS-800-2	800	480	2	EN-GJS-HB300	DA 245 A 335	Perlite

Table of Special Cast Iron, Produced in Foundry (Table 1 of 2)

Austempered Ductil Iron - A.D.I.

The main feature of A.D.I. cast iron is the ability to reach, after austenitizing heat treatment, very high characteristics of mechanical strength maintaining good machinability, thanks to the ausferritic or bainitic structure.

Cast iron coding	Thickness of the casting "t" in mm.	min. Tensile Strength R_m	min. Yield Strength $R_{p0,2}$ N/mm ²	Elongation A % min.
ISO 17804/JS/800-10	$t \leq 30$	800	500	10
	$30 < t \leq 60$	750	500	6
	$60 < t \leq 100$	720	500	5
ISO 17804/JS/900-8	$t \leq 30$	900	600	8
	$30 < t \leq 60$	850	600	5
	$60 < t \leq 100$	820	600	4
ISO 17804/JS/1050-6	$t \leq 30$	1'050	700	6
	$30 < t \leq 60$	1'000	700	4
	$60 < t \leq 100$	970	700	3

White Cast-Iron resistant to wear and tear caused by abrasion

The castings made with White Cast Iron resistant to wear and tear are mainly used in mining, in earth moving activities, rolling and all those fields that require a high resistance to minerals and other abrasive solids. The abrasion resistance depends on the structure and the typical hardness of these alloys with a high Nickel and Chrome content.

Nickel-Chrome Cast Iron, Abrasion resistant

Cast iron code Designation	Hardness Vickers HV	Chemical Composition %						
		C	Si	Mn	P	S	Ni	Cr
EN-GJN-HV520 EN-JN2029	520 min.	from 2,5 to 3,0	max 0,8	max 0,8	Max. 0,10	Max. 0,10	from 3,0 to 5,5	from 1,5 to 3,0
EN-GJN-HV550 EN-JN2039	550 min.	from 3,0 to 3,6	max 0,8	max 0,8	Max. 0,10	Max. 0,10	from 3,0 to 5,5	from 1,5 to 3,0
EN-GJN-HV600 EN-JN2049	600 min.	from 2,5 to 3,5	from 1,5 to 2,5	from 0,3 to 0,8	Max. 0,08	Max. 0,08	from 4,5 to 6,5	from 8,0 to 10,0

Structure composed of eutectic carbides M₃C type (M=Fe, Cr) in matrix composed of martensite and eventually bainite, along with residual austenite or complex carbides of type M₇C₃ and M₃C (defined cast iron castings 9%Cr 5%Ni)

Ghise ad Alto Tenore di Cromo, Resistenti all'Abrasione.

Cast iron code Symbol and Nr.	Vickers Hardness HV	Chemical Composition %								
		C*	Si	Mn	P	S	Cr	Ni	Mo	Cu
EN-GJN-HV600 (XCr11) EN-JN3019	600 minimum	1,8 to 2,4 2,4 to 3,2 3,2 to 3,6	max 1,0	da 0,5 a 1,5	max 0,08	max 0,08	from 11,0 to 14,0	2,0	Max. 3,0	Max. 1,2
EN-GJN-HV600 (XCr14) EN-JN3029	600 minimum	1,8 to 2,4 2,4 to 3,2 3,2 to 3,6	max 1,0	da 0,5 a 1,5	max 0,08	max 0,08	from 14,0 to 18,0	2,0	Max. 3,0	Max. 1,2

*For every Chrome content range, it exists three different Carbon content ranges.

Structure composed of complex carbides in mostly martensitic matrix (at the hardened state), but it could include residual austenite or other austenite transformation structures.

Table of special cast iron, produced in foundry (Tabella 2 di 2)

Spheroidal Cast Iron Silicon-Molybdenum Alloyed (SiMo)

This spheroidal graphite Silicon-Molybdenum alloyed cast iron, is generally used with ferritic structure at the annealed state. The main use is creating castings to be employed at high temperatures ($\leq 750^\circ$), where is required high thermal shock, oxidation and heat milling strength. This material is largely used in the creation of thermal engines (automotive fields).

Chemical Composition Per Cent

Indicative Percentage		Binding Percentage				
C	Mn	Mg*	Si	Mo	P	S
3,6	0,3	0,01 ÷ 0,05	4,0 ÷ 4,5	1,0 ÷ 1,5	$\leq 0,05$	$\leq 0,015$

*In case the spheroidisation happens in the ladle, the magnesium standard could be included between 0,03 and 0,08.

Mechanical Features detected at Room Temperature ^(a)

Traction Strength R min. (N/mm²)	Yield Point Rs min. (N/mm²)	Elongation % A5 min.	Brinell Hardness HB.
490	375	8	da ≥ 200 a < di 240

^(a) Features detected on standard specimen casted separately or on specimen collected from castings without thermal treatment (AS cast), in specified spots on the drawing or arranged with the producer.

Traction Strength at High Temperature

Proof Temperature in °C.	Traction Strength R in N/mm ²
300	490
400	410
500	295
600	145
700	80

Structural Features

Mould: mainly ferritic with scattered carbides $\geq 15\%$ (without thermal treatment).

Graphite: Form IV - Type A - Dimensions 5÷7 it is tolerated the presence of non-spheroidal graphite <10

Physical and Technological Features (indicative values)

Volumic Mass at 20°C.: 7,1 Kg./dm ³	
Modulus of Longitudinal Elasticity E.: 157'000 N/mm ²	
Modulus of Transversal Elasticity G.: 62'000 N/mm ²	
Resistivity: 40 - 105 $\mu\Omega$ cm.	
Specific Heat at 20 - 100°C.: 0,607 J/(g • K)	
Thermal Conductivity Coefficient at 100°C.: 0,251 W/(cm • K)	
Thermal Dilatation Coefficient:	20 - 200°C : 11,4 MK ⁻¹
	20 - 540°C : 12,1 MK ⁻¹
	20 - 815°C : 13,3 MK ⁻¹
Utensile Machinability: Good	
Weldability: Difficult	

On request, it can also be produced other special cast irons, our technical-metallurgical laboratory is at Your complete disposal in order to evaluate the feasibility, based on the technical features required.