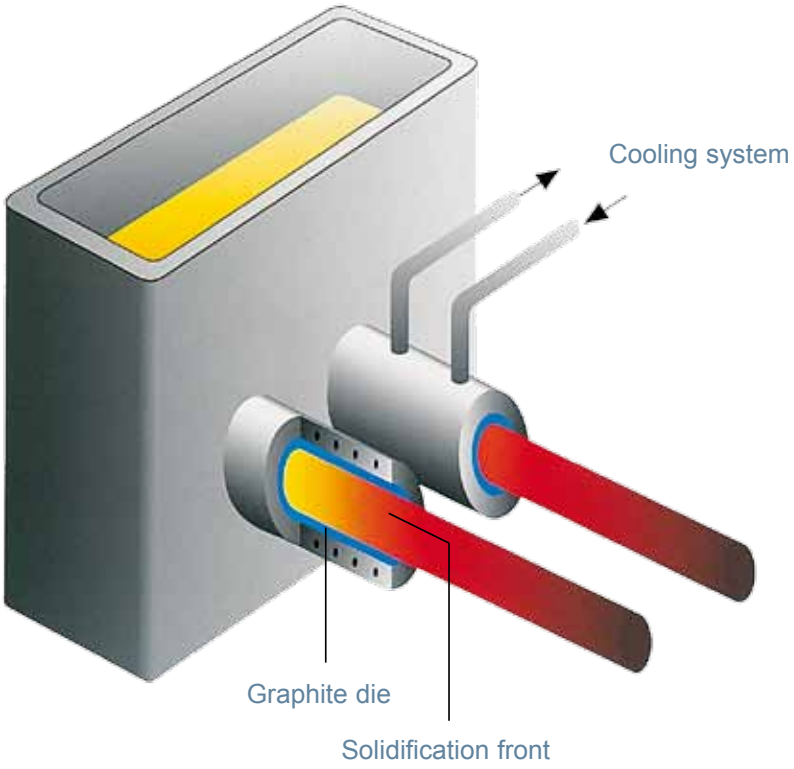
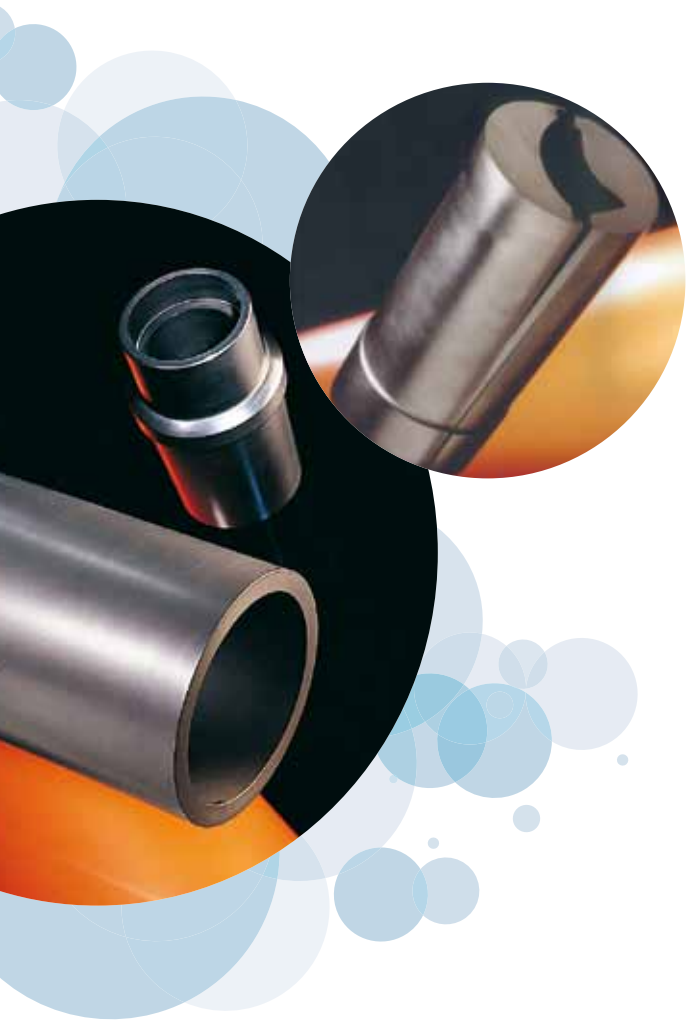
SPECIALITY GRAPHITE MATERIALS

FOR CONTINUOUS CASTING

MERSEN

HORIZONTAL CONTINUOUS CASTER





CONTINUOUS CASTING

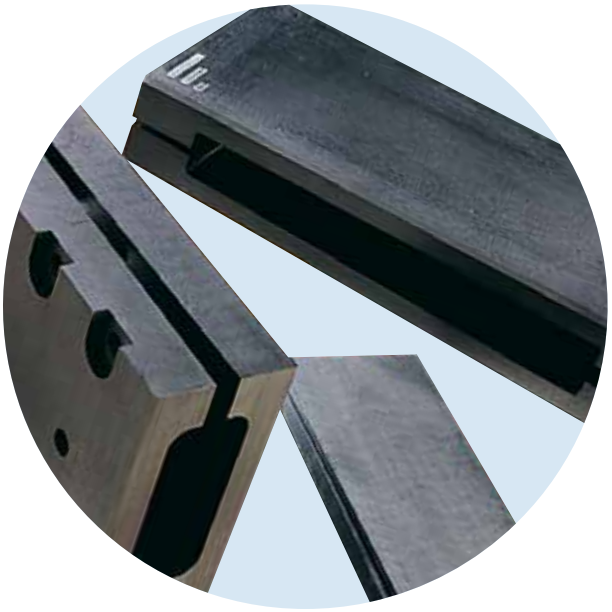
is a metallurgical process which allows continuous control of the transformation from a liquid metal to a solid state in order to directly obtain semi-finished products like:

- wires,
- rods,
- tubes,
- strips,
- custom sections.

The graphite “die” used in this transformation, permits:

- the shaping of the metal,
- the heat extraction necessary to transform the metal from liquid to solid state.

The selection of the best graphite grade for your application...



… depends mainly on the composition of the alloy to be cast: grey iron requires a graphite resistant to wear abrasion; brass, a graphite relatively dense but with enough open porosity to allow zinc to evaporate in the area of the solidification front; non-ferrous alloys containing elements like nickel or cobalt need high density graphite to reduce chemical attack of the graphite die...

The other parameters which determine the choice of the grade are:

- the size and shape of the cast section,
- the speed of casting,
- the total amount of alloy to cast,
- casting orientation (i.e, vertical or horizontal).

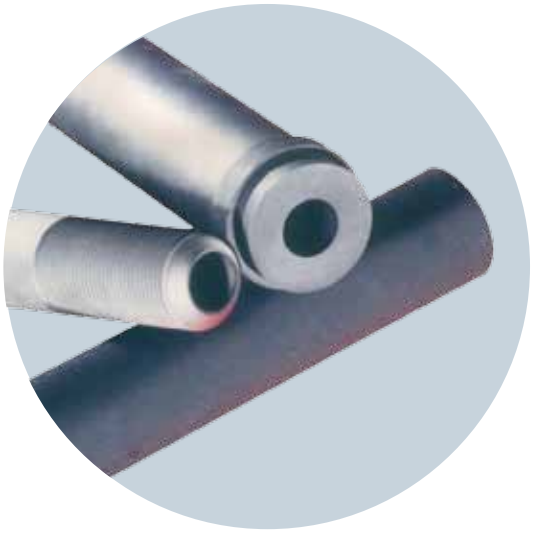
In addition to the graphite grade chosen, the casting results are also a function of die design, quality of machining, and the specific characteristics of the casting installation. Our grades have been developed in conjunction with foundrymen to obtain the proper blend of physical characteristics for continuous casting. We can provide technical services to assist you in finding a suitable graphite for your application. However, in many cases optimal grade selection can be made only through actual trials.
The following application chart should be used only as an indicative guide for grade selection.

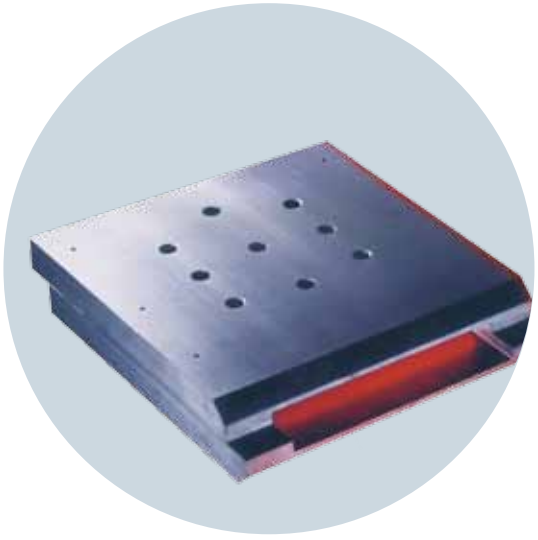
Recommended grades

Cast alloy	Wire casting	Billet casting	Strip casting	Tube casting
Grey and ductile iron	-	2020	-	2020
Brass (Cu-Zn)	2191, 2204	2191, 2114	2220, 2204	2220, 2191
Bronze	2191, 2204	2191, 2114	2204, 2230	2191, 2220 (Core)
Phosphorus bronze	2220, 2204	2191, 2220	2220, 2204	2191, 2220
Maillechort (Cu-Zn-Ni) Nickel-silver	2230, 2204	2230	2204, 2230	2191, 2204
Nickel-copper	2230, 2204	-	2204, 2230, 2450	-
Red copper, Phosphorus deoxidized copper	2191, 2235	2191, 2114	-	-
Aluminium	-	2191	2220	-
Silver, Gold	2191	-	2191	2191
Precious metal alloys	2204, 2450	-	2204, 2450	2204, 2450

Typical characteristics

Property	Unit	2191	2020	2114	2220	2204	2450	2230
Density	g/cm³	1.75	1.77	1.81	1.84	1.85	1.86	1.90
Porosity	%	12	9	10	8	8	8	4
Hardness	Rockwell	80 (L)	95 (L)	70 (H)	80 (H)	80 (H)	80 (H)	85 (H)
Modulus of elasticity	GPa	10.1	9.2	11.4	11.4	10.1	9.2	11.4
Flexural strength	MPa psi	44 6,400	45 6,500	52 7,500	58 8,400	44 6,400	45 6,500	58 8,500
Compressive strength	MPa psi	97 14,100	99 14,300	103 15,000	124 18,000	97 14,100	99 14,300	124 18,000
Coefficient of thermal expansion	x 10^{-6} /°C /°F	4.2 2.3	4.3 2.4	5.3 3.0	5.5 3.1	4.2 2.3	4.3 2.4	5.5 3.1
Electrical resistivity	µΩcm Ωin	1,090 0.00043	1,550 0.00061	1,240 0.00049	1,140 0.00045	1,090 0.00043	1,550 0.00061	1,140 0.00045
Thermal conductivity	W/m°C BTU-Ft/Ft2 Hr°F	116 67	85 49	104 60	112 65	116 67	85 49	112 65
Average grain size	µm in	15 0.0006	15 0.0006	13 0.0005	13 0.0005	15 0.0006	15 0.0006	13 0.0005
Standard block size	mm in	545 x 545 x 1,830 21.4 x 21.4 x 72	530 x 635 x 1,830 20.8 x 25 x 72	308 x620 x 915 12 x 24 x 36	308 x 620 x 915 12 x 24x36	308 x 545 x 915 12 x 21.4 x36	308 x 530 x 915 12 x 20,8 x 36	152 x 620 x 915 6 x 24 x 36



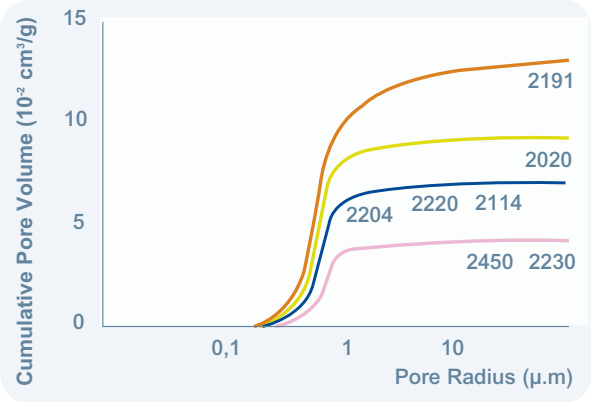


Our materials are in conformity with the RoHS-Directive (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment).

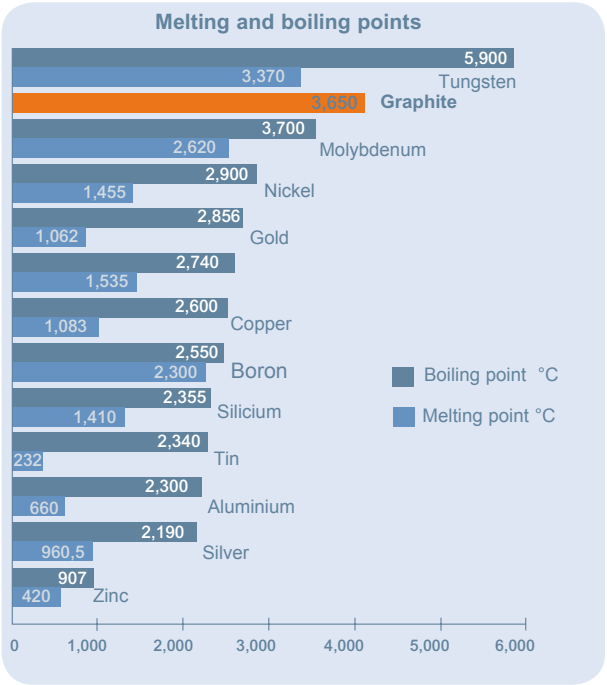
Besides Mersen guarantees the application of the European Community REACH-Regulation (Registration, Evaluation, Authorisation and Restriction of Chemical substances) to all its plants located in Europe.

Graphite is well adapted for use as continuous casting dies because of its unique physical characteristics:

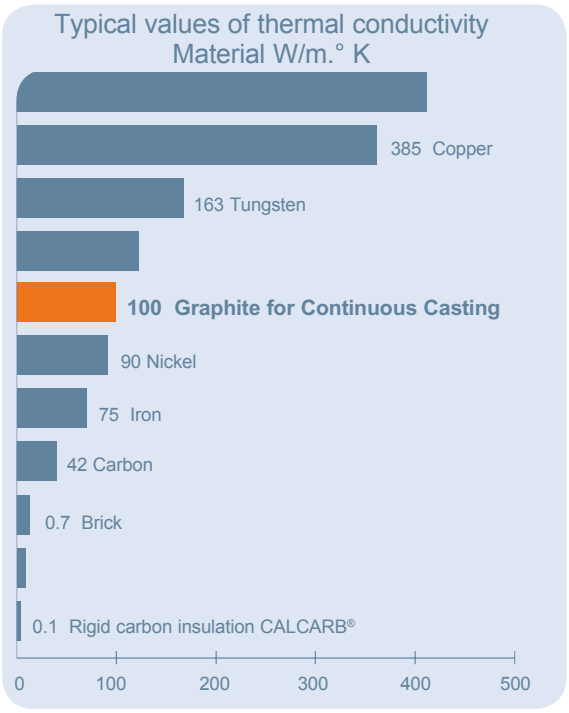
• Non-wetting to most metals due to its low reactivity and low porosity. These characteristics can be tailored to specific casting requirements through selective processing.

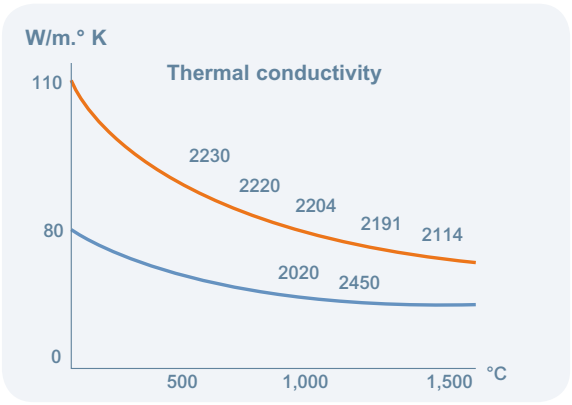


• Capable of withstanding molten metal temperatures. Graphite sublimates at 3,650°C and atmospheric pressure.



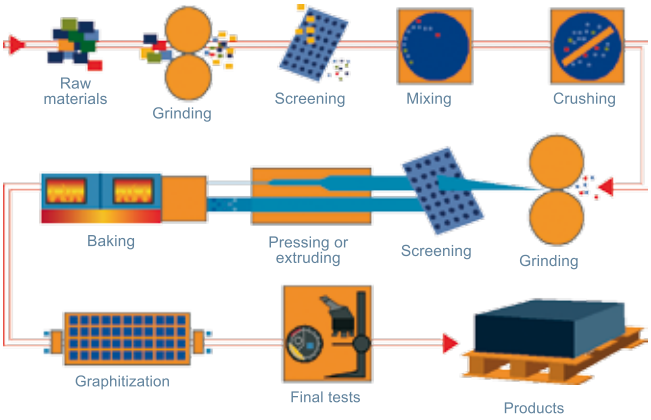
• High thermal conductivity.





• Easy to machine and to polish.

GRAPHITE MANUFACTURING



MERSEN
Expertise, our source of energy

A WORLD EXPERT
in materials and solutions for high temperature processes

A GLOBAL PLAYER

Global expert in materials and solutions for extreme environments as well as in the safety and reliability of electrical equipment Mersen designs innovative solutions to address its clients specific needs to enable them to optimize their manufacturing process in sectors such as energy, transportation, electronics, chemical, pharmaceutical and process industries.

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