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ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION

R 943

BLACKHEART MALLEABLE CAST IRON

1st EDITION

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Also issued in French and Russian. Copies to be obtained through the national standards organizations.

BRIEF HISTORY

The ISO Recommendation R 943, *Blackheart malleable cast iron,* was drawn up by Technical Committee ISO/TC 25, *Cast iron,* the Secretariat of which is held by the British Standards Institution (BSI).

Detailed work on this question by the Technical Committee led, in 1966, to the adoption of a Draft ISO Recommendation.

In February 1967, this Draft ISO Recommendation (No. 1194) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Argentina	Germany	Romania
Australia	Greece	South Africa, Rep. of
Belgium	India	Sweden
Brazil	Israel	Switzerland
Canada	Korea, Rep. of	Thailand
Chile	Netherlands	Turkey
Czechoslovakia	New Zealand	U.A.R.
Finland	Norway	United Kingdom
France	Portugal	Yugoslavia

One Member Body opposed the approval of the Draft :

Italy

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in January 1969, to accept it as an ISO RECOMMENDATION.

ISO Recommendation R 943 January 1969

BLACKHEART MALLEABLE CAST IRON

1. SCOPE

This ISO Recommendation refers to the characteristics of blackheart malleable cast iron and its classification by mechanical properties. Details are also included on testing conditions, dimensions of test bars and sampling.

2. GENERAL

2.1 Malleable cast iron is a heat-treated iron-carbon alloy, which solidifies in the as-cast condition with a graphite-free structure, i.e. the total carbon content at the moment of solidification is present in the dissolved form and in the combined form as cementite (Fe_3C).

2.2 Three groups of malleable cast iron are specified, differentiated by the temperature and time cycle of the annealing process, by the annealing atmosphere and by the properties resulting therefrom, as follows :

- whiteheart malleable cast iron (see ISO Recommendation R 942);
- blackheart malleable cast iron (covered by this ISO Recommendation);
- pearlitic malleable cast iron (see ISO Recommendation R 944).

3. CHARACTERISTICS OF BLACKHEART MALLEABLE CAST IRON

The microstructure has a matrix essentially of ferrite. Temper carbon is also present.

The microstructure should not contain primary or flake graphite.

4. MECHANICAL PROPERTIES

4.1 Tensile strength, proof stress, elongation

The minimum tensile strength, proof stress and elongation of grades A, B and C should be in accordance with the values included in Table 1.

TABLE 1 – **Minimum mechanical properties of blackheart malleable cast iron**

Grade	Diameter of test bar	Tensile strength		0.5 % proof stress *		0.2 % proof stress *		Elongation ($L_o = 3d$)
	mm	kgf/mm^2	tonf/in^2	kgf/mm^2	tonf/in^2	kgf/mm^2	tonf/in^2	%
A	15	35	22.2	21	13.3	19	12.1	12
B	15	32	20.3	19	12.1	17	10.8	10
C	15	30	19.0	–	–	–	–	6

* In cases of dispute regarding the proof stress values, the value for the 0.5 % proof stress should be binding.

4.2 Brinell hardness (for information only)

The Brinell hardness, measured at an agreed point on the casting, should not exceed the values, which are given for information only, in Table 2.

TABLE 2 – **Brinell hardness of blackheart malleable cast iron**

Grade	Brinell hardness, HB max.
A	150
B	160
C	160

5. TESTING CONDITIONS

5.1 Tensile test

For the tensile test (tensile strength, proof stress, elongation), test bars in accordance with section 6 should be used.

5.2 Brinell hardness test

The Brinell hardness test should be carried out in accordance with ISO Recommendation R 184, *Brinell hardness test for grey cast iron.*