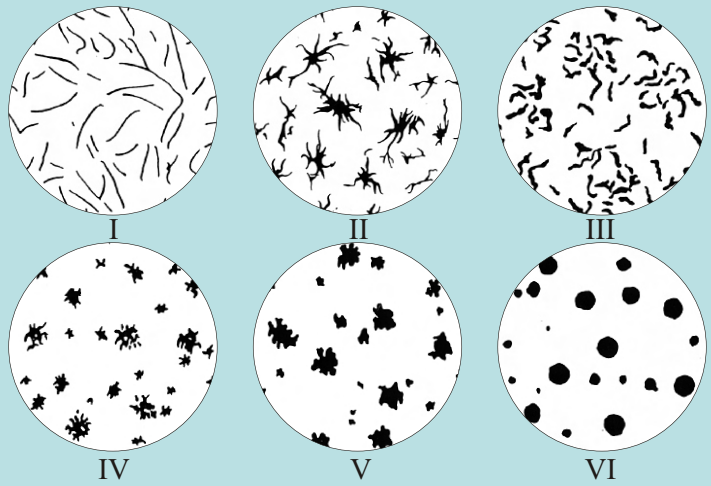
GRAPHITE STRUCTURES IN CAST IRONS

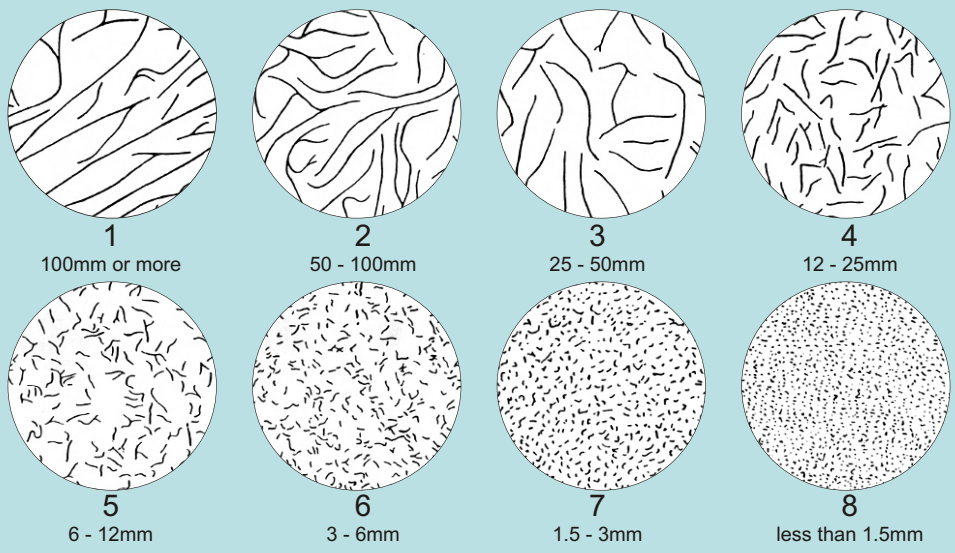
GRAPHITE FORMS

Diagrammatic representations of the standard graphite forms in cast irons



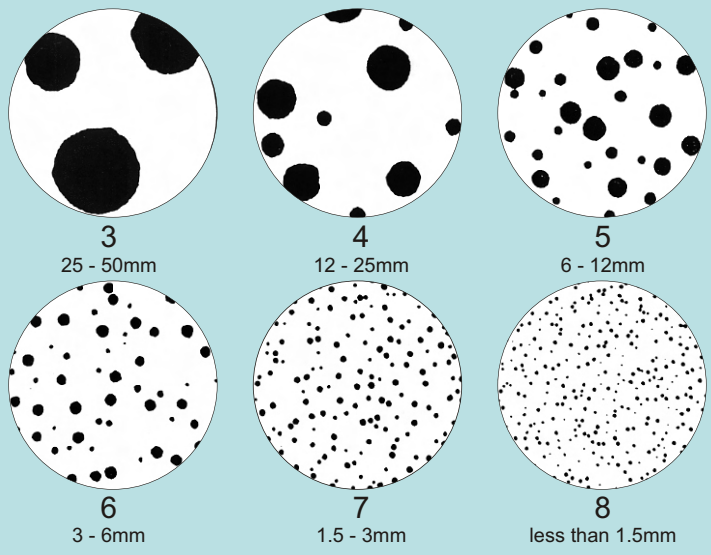
GRAPHITE SIZES IN GREY CAST IRON

Diagrammatic representations of the standard flake graphite sizes in grey cast iron at x100 magnification (Form I Distribution A)



GRAPHITE SIZES IN DUCTILE IRON

Diagrammatic representations of the standard graphite nodule sizes in ductile iron at x100 magnification(Form VI)



INOCULANTS

Elkem manufactures and markets a series of high quality inoculants to treat cast iron and ensure the production of the ideal graphite form, distribution and freedom from chill (cementite).

Inoculant	Active Elements	Advantages and Uses
Superseed® 75/50	Si, Sr	Low Al content. Low eutectic cell count through lower addition rates. High chill reduction.
Foundrisil®/Barinoc®	Si, Ba, Ca, (Al)	High chill reduction. Resistance to fading. Used in all cast irons.
Ultraseed®	Si, Ca, Ce, (Al,S,O)	High nodule count. Improved nodularity. Helps to prevent micro-shrinkage. Reactivates "dead" irons.
Reseed®	Si, Ca, Ce, (Al)	High nodule count. Improved nodularity. Controls tramp elements in ductile irons. Low S grey iron.

All inoculants are available in sizes suitable for ladle or in-stream additions. Other inoculants for specialist applications are available.

NODULARISERS

Elkem manufactures and markets a range of high quality nodularising alloys to produce ductile and compacted graphite cast irons. They contain balanced ratios of the active elements to control reactivity, minimise slag and neutralise tramp elements.

Product	Active Elements	Advantages and Uses
Elmag®	Si, Mg, Ca, Rare Earths	Magnesium contents from 4 to 10%. Calcium from 0.2 to 3.5%. Rare Earths from 0.1 to 3%. Allows the choice of the ideal alloy for all foundry conditions.
Remag®	Si, Mg, Ca, Rare Earths	High RE, low Mg alloy for low reactivity. Suited to thin section ductile iron castings.
Lamet™	Si, Mg, Ca, La	Alloy for in-the-mould treatment of ductile iron. Helps to prevent shrinkage.
CompactMag™	Si,Mg, Ca, Rare Earths	Highly effective alloy for the production of compacted graphite irons with reduced section sensitivity and wide production window.

Please refer to your local Elkem representative for further information on the range of products available for grey, compacted and ductile irons.

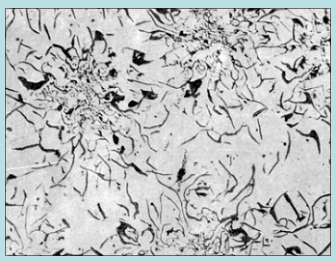
The graphite form, distribution and size diagrams are taken from the international standard EN ISO 945:1994 by kind permission of the British Standards Institution, London. W4 4AL.

Photographs of the graphite structures are reproduced by kind permission of Elkem Research, Kristiansand, Norway and the Castings Development Centre, Alvechurch. Birmingham. B48 7QB.

GRAPHITE DISTRIBUTION IN GREY CAST IRON

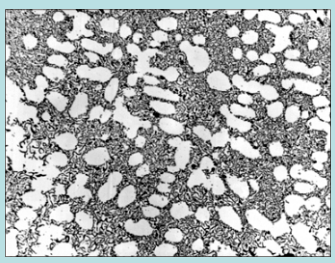
TYPE A
Random flake graphite in a uniform distribution

TYPE B
Rosette flake graphite

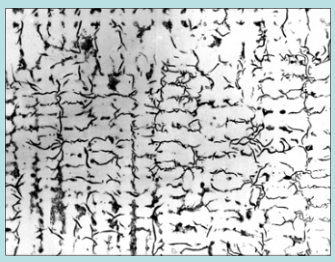


TYPE C
Kish graphite
(hyper-eutectic compositions)

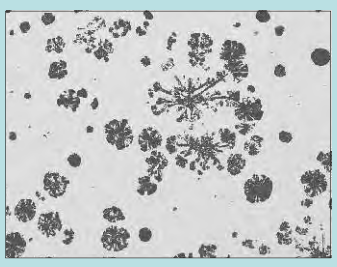
TYPE D
Undercooled flake graphite



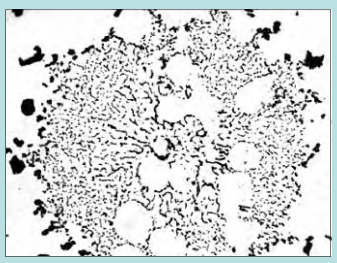
TYPE E
Interdendritic flake graphite
(hypo-eutectic compositions)



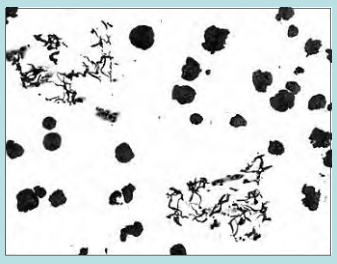
SOME ABNORMAL GRAPHITE FORMS IN DUCTILE IRON



EXPLODED GRAPHITE
Caused by high purity charge materials and excess rare earth additions in high carbon equivalent irons or in thicker section castings



CHUNKY GRAPHITE
Caused by high purity charge materials and excess rare earth additions in large section castings or at high carbon equivalent



SPIKY GRAPHITE
Caused by small amounts of tramp elements, e.g. lead, bismuth, antimony and titanium, in the absence of cerium

Description of a structure should follow the convention
Form : Distribution : Size, e.g. Type IA4 for a grey cast iron Type VI5 for a ductile iron

www.foundry.elkem.com

Elkem ASA, Foundry Products Division, Hoffsveien 65B, PO Box 5211 Majorstua, N-0303 Oslo, Norway. Tel: +47 22 45 01 00 Fax: +47 22 45 01 52