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17. A Fundamental Study on Nodular Graphite Cast Iron. (II)

The Influence of the Casting Conditions on the Micro-structures of Nodular Graphite Cast Iron

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The influences of the temperature of the mould, the pouring temperature and the thickness of the castings on the micro-structures of the nodular graphite cast iron were studied.

Many specimens of nodular graphite cast iron of various chemical compositions were prepared by means of the same method as described in the 1st. report. Specimens used for studies on the influence of the temperature of the mould and the pouring temperature were cast at about 1200°C, 1250°C, 1300°C into the sand moulds (20 mm dia.×130 mm), which were held at about 200°C, 400°C, 600°C and the room temperature. Specimens for the study on the influence of the thickness of the castings were cast at about 1300°C into three kinds of pieces (10 mm dia.×50 mm, 30 mm dia.×50 mm and 50 mm dia.×50 mm) of the dry sand mould.

From the study of the micro-structures of these specimens, the following results are obtained.

(1) The higher the temperature of the mould is, the larger the size of graphite and the more irregular the form of nodular graphite is. It should be noticed that the nodular form of graphite is more spheroidal in the interior 2 mm apart from the outer edge than in the marginal part and that the structures of the marginal part are more ferritic than the central part.

(2) The lower the pouring temperature is, the more spheroidal the form of nodular graphite is and the less amount of flaky graphite. These phenomena are more remarkable in the case of the higher temperature of the mould than in the case of the lower temperature of the mould.

(3) In the case of the lower pouring temperature and the lower content of silicon, the thicker the cross section of the castings is, the larger the size of nodular graphite and the more uniform the form of graphite is.

In the case of the higher pouring temperature and the higher content of silicon, the size of graphite in the central part and the form of graphite all over the whole surface are approximately uniform irrespective of the thickness.