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The Effects of Manganese and Sulphur on the Graphitization  
and Mechanical Properties of High Grade Cast Iron  
Annealed at Low Temperatures\*

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**Abstract**

By the low temperature annealing treatment of high grade cast irons for the release of casting stress, the degradation of the qualities of irons must be avoided. The purpose of this research is that the effects of the melting condition and the relation between manganese and sulphur to the low temperature annealing treatment are investigated. The annealing of the specimens was carried out at 500°, 550° and 600°C for 6 hrs and then the specimens were cooled in a furnace. The results obtained are summarized as follows: (1) In as-cast and in annealing state, the mechanical properties of the cast irons by oxidizing refining are much lower than those of the cast irons by reducing refining. (2) In the plain high grade cast irons, the velocity of decomposition of carbide in annealing at 600°C for 6 hrs is higher than that in annealing at and below 550°C. Therefore, because of the softening of pearlite matrix, the tensile strength and the hardness of specimens treated by the former procedure are much lower than those of specimens treated by the latter procedure. The lower the manganese content is, the larger becomes this tendency and the amounts of 0.80 to 1.00 per cent manganese is effective to prevent this tendency. (3) The rate of graphitization of the specimens prepared by oxidizing refining is maximum, when it contains 0.06 per cent sulphur and by this rapid graphitization, the mechanical properties of this specimens is reduced. (4) The rate of graphitization of the specimens prepared by reducing refining which contain 0.06 per cent sulphur is comparatively low and, as compared with the mechanical properties of the specimens prepared by reducing refining which contain 0.03 per cent sulphur, those of the former specimens are better.

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