

Occurrence and behavior of Mo-containing precipitations in nodular cast iron at high temperatures

Lutz Dekker¹, Babette Tonn²

¹ Stahlwerk Bous GmbH, Saarstraße, D-66359 Bous, Germany

² Institute of Metallurgy, Clausthal University of Technology, Robert-Koch-Str. 42; D-38678

Clausthal-Zellerfeld, Germany

In nodular cast iron molybdenum is alloyed in the range of 0.5 wt.-% to 1.5 wt.-% to increase the mechanical properties for high temperature application, especially for thick-walled castings like housings of gas or steam turbines. The behaviour of Mo-precipitations in the as cast state as well as under long exposure to heat was the object of this investigation. In the as-cast state Mo forms metastable carbidic grain-boundary precipitations with iron, silicon and carbon. These transform into stable MoC precipitations during sustained temperature influence. Furthermore, there are finely dispersed Mo-containing precipitations found in the matrix. These increase the high temperature strength of Mo-alloyed cast iron due to the Orowan mechanism and the occurrence of additional grain boundaries. However, it has been shown that these Mo-containing precipitations underlie Ostwald ripening under continuous heat exposure and a precipitation free area occurs along the ferritic grain boundary.

Keywords: ductile iron, high-temperature application, molybdenum, Ostwald-ripening

Article available in the International Journal of Cast Metals Research