DETERMINATION OF SOLIDUS AND LIQUIDUS TEMPERATURES IN THE LOW CARBON STEEL USING THREE DEVICES FOR HIGH-TEMPERATURE THERMAL ANALYSIS AND SPECIALIZED PROGRAMS

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Abstract

The paper is devoted to a discussion of the results obtained by the simultaneous use of three methods of thermal analysis in three different specialized devices with the aim to precise solidus and liquidus temperatures. The low carbon as-cast steel (130 mm round format) from Continuous Casting Machine No. 3 in ArcelorMittal Ostrava a.s. (CCM No. 3) was studied. The series of experiments with large samples (approx. 23 g) based on direct thermal analysis was carried out on Netzsch STA 449 F3 Jupiter device. The differential scanning calorimetry (DSC) method with special 3D sensor for other samples (approx. 1 g) was applied on Setaram MHTC 96 device. The third device (Setaram SETSYS 18TM) was used for solidus and liquidus temperatures determination by differential thermal analysis method on small steel samples (approx. 150 mg). Thermo analytically determined solidus and liquidus temperatures were then compared with values obtained by calculations in specialized IDS and CompuTherm software and with liquidus temperature currently defined in CCM No. 3 practice for continuous casting of discussed steel grade control.

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Keywords: steel, round billet, solidus temperature, liquidus temperature, thermal analysis, software

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