EXPANDED VERMICULITE AS HEAT INSULATION MATERIAL

V. S. Spirina and M. I. Flerova

UDC 66.018.4

Heating the surface of the casting heat of the ingot gives a 2-4% increase in the yield of usable metal [1].

At the Chelyabinsk Metallurgical Combine (ChMC) the heat-storage of the feeder heads of 10-ton ingots was improved by the replacement of the chamotte lining with a lightweight lining of chamotte brick of apparent densities 1.3 and 0.8 g/cm^3. The lightweight brick gave a slight increase in the yield of usable steel ([2], p. 38) but was not adopted owing to the absence of a mechanized method of applying a protective refractory layer on its working surface and owing to the high cost of the insulation.

A ceramic vermiculite heat insulation material of apparent density 0.25-0.30 g/cm^3 and containing expanded vermiculite and refractory clay in the volume ratio of 1/9 has been developed at the Ural Scientific-Research Institute for Building Materials. The excellent heat-insulation properties of the material [thermal conductivity 0.068-0.07 kcal/(m · h · deg C) at an average temperature of 20°C] prompted a decision to test it as heat-insulation layer in ingot feeder heads (Fig. 1). The lining was produced in two layers, i.e., a working layer of chamotte as the base and a heat-insulating layer of ceramic vermiculite. The tests showed that according to the thermotechnical data a 30 mm thick working layer and a 70 mm thick heat-insulation layer gave the best results.

It was established that the temperature at the boundary between the chamotte base and the vermiculite layer was 1150-1200°C while the working temperature of the proposed material does not exceed 1000°C. Further experiments were carried out with a view to increasing the working temperature of the lightweight vermiculite material by 150-200°C by adding a refractory binder or filler.

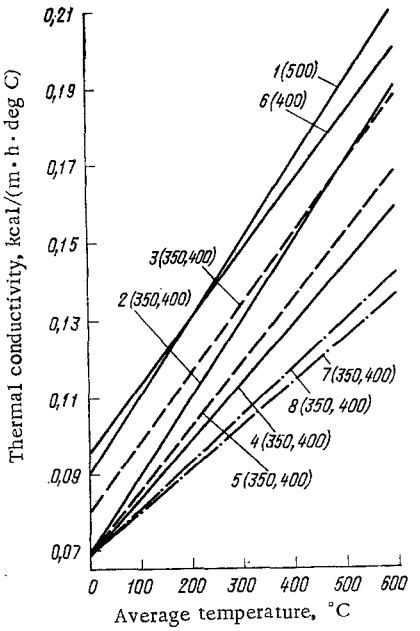

Fig. 1. The temperature dependence of the thermal conductivity of heat-insulation materials: 1) diatomites; 2-3) foam diatomites; 4-5) perlite ceramics; 6) ultralightweight chamotte; 7-8) ceramic vermiculites. The product brand is denoted by the figures in parentheses.

Ural Scientific-Research Institute for Building Materials. Chelyabinsk Metallurgical Plant. Translated from Ogneupory, No. 4, pp. 7-10, April, 1975.