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LITERATURE CITED


DEFORMATION AND STRENGTH CHARACTERISTICS OF MAGNESIA-SPINNELLIDE REFRactories AT ELEVATED TEMPERATURES


During the operation of metallurgical units, refractory linings are subjected to thermal stresses. Numerous studies have been carried out for understanding the fracture behavior of thermally stressed refractories [1-9].

In order to study the specific features of the wear of refractory products under the influence of thermal stresses, we carried out studies on the high-temperature deformation characteristics and the bend strength of four types of magnesia-spinellide refractories.

Following the technological process sheet of the "Magnezit" Combine, we produced heat resistant KhPT grade chromite periclase products and three types of periclase chromite refractories that differ from each other with respect to the degree of dispersion of the chromium ore used (MKhS, PShS, and MKhS obtained according to a complex technological route*). Sintered Satkinsk periclase and chromium ore obtained from the Kempirsaisk deposit were used as raw materials. Table 1 and 2 show their chemical composition and granulometric composition, respectively.

Table 3 shows the charge composition of the experimental refractories. The finely milled constituent of the refractories contains 95% particles belonging to the minus 0.6 mm

*For sake of convenience, the previously adopted designations of the periclase-chromite refractories are used in this paper.

fraction. Commercial grade lignosulfonates (CLS) having a density of 1.20-1.22 g/cm³ were used as a temporary binder. Refractories were shaped using a hydraulic press at a pressure of 130 N/mm² and were fired in a tunnel furnace at 1700°C maintaining a dwell of 4 h at this temperature. The quality parameters of the obtained refractories are given in Table 4.

In order to study the deformation and the strength characteristics, we followed the procedure developed by Shpindler et al. [10]. Beam-type test specimens measuring 70 × 20 × 15 mm were cut-out from the refractory products. Testing was carried out at 20, 800, 1000, 1200, 1350, and 1500°C.

We calculated the ultimate bend strength \(\sigma\) and the fracture strain \(\epsilon\) at the given temperatures according to the well known equations of Strength of Materials [11]

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\sigma = \frac{3PL}{2bh^2}, \quad \epsilon = \frac{6h}{L}.\]