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This research paper gives the development data obtained for modern modified periclase-spinel materials that have an increased adaptive ability to preserve the material integrity and the operational reliability of the refractories exposed to the effect of the sign-alternating high-gradient and thermal loads. Based on the research done, a concept was developed to improve the heat resistance of the periclase-spinel materials and it includes both the known mechanisms of absorbing excess energy by cracks that are developed under the action of thermal shocks (in particular, the effect of heterophasicity and creation of a microcracked structure due to the difference in thermal efficiency coefficients (TEC) for different phases) and new mechanisms of the structure-&-phase adaptations preserving simultaneously the integrity of modified periclase-spinel refractories. The use of the developed modified periclase-spinel refractories results in the energy saving of up to 15 %, reduction of material costs due to the extension of the service life of the lining elements of rotary kilns; reduction of the resources required for the maintenance and an increase in the amount of overhaul sessions.

Key words: periclase, spinel, refractory, modifier, cement, rotary kiln and thermal stability