specific gravity of not over 2.38. Some quartzites invert to cristobalite more slowly than others and brick with a lesser content of cristobalite have a lower spalling tendency and also do not show an appreciably greater permanent expansion when subjected to long-continued heating. Brick made from this type of quartzite may be properly burned when inversion has occured to such an extent that its specific gravity is slightly greater than 2.38. Examples with analyses are given. Metal-cased magnesite brick consist of steel containers of square or circular cross section, filled with dead burned magnesite. These are laid as headers in the furnaces. When heated the steel fuses and impregnates the magnesite forming a monolithic lining. Such a lining is more porous than one of magnesite bricks and has the advantage of better withstanding rapid temperature changes. Such bricks may be used in place of magnesia and silica brick in parts of the open hearth steel furnace and in electric steel melting furnaces.

Interesting facts concerning refractories in the iron and steel industry: C. E. Nesbitt and M. L. Bell. In this paper the writers state the importance of refractories and emphasize the necessity for their greater efficiency in the iron and steel industry. This improvement can only be accomplished by the cooperation of the producer and the consumer. In the manufacture of iron and steel, refractories meet a wide range of temperature, while destructive agencies such as acid, basic or neutral slags, severe thermal changes, load, abrasion, impact and expansion are present in varying degrees of severity. Tests on refractory brick, easily and rapidly executed, which show a close relation to actual service conditions were developed for determining the resistance to these destructive agencies. The most important working qualities can be determined by two or three tests namely the spalling and hot crushing tests for silica brick, and the spalling, hot load and slagging tests for clay brick. Variations in the life of blast furnace linings, open hearth roofs, converter bottoms soaking pits and ladle linings are mentioned. Results are given showing the marked decrease in crushing strength and increase in spalling of silica brick defective from fire cracks, poor moulding, poor slicking, etc. The writers show the close relationship of the spalling test results with the life obtained in open hearth roofs. The effect of the degree of fineness or size of particles in silica brick is illustrated by results of the spalling test. The effect on certain qualities of clay brick produced by the method of manufacture is illustrated by spalling and load test results. The effect of the degree of fineness and the reduction of strength by heating of clay brick is also shown. From the comparative data it is evident that refractories require most thorough study. Simple practical tests which can be run in quantity and which give data showing variations in quality which reflect on the life of the structure should be adopted. A more uniform product can be secured if a careful study is made of the variations in manufacture which effect the important qualities.

Superior refractories: R. C. Purdy.

Refractory problems in the gas industry: W. H. Fulweiler and J. H. Taussig. In the coal gas process the temperatures range from 400° C. to 1500° C. Rapid changes in temperature and expansion must be considered. Silica material is used in the retorts and the combustion chamber. Fire clay material is used in the recuperators and where the temperature is below 1000° C. In the water gas process the temperature may be 1700° C. in the generator, together with the slagging action due to the ash from the fuel. Abrasion occurring in removing clinker is important. In the carburettor the checker brick are heated to 1200° C. and sprayed with cold oil. Fire clay is used in the generator linings, but other materials are being tried. Cements used in construction frequently do not receive proper attention. Laboratory tests are useful in controlling the quality of materials.

Charles L. Parsons,
Secretary

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