

(45) Production of acid and basic pellets by LKAB

LKAB (Sweden)

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The Swedish mining company Luossavaara-Kiirunavaara AB (LKAB) produces a total of 32 Mton iron ore annually at its three mines. In the future, production will increase to about 40 Mton a year. 25 per cent of the present production, i.e., 8.2 Mton a year, consists of pellets, manufactured at four pellets plants. All three commercial pelletizing methods existing are now used at these plants. The pellets part of the company's total output is expected to increase in the future. Of the present annual pellet output nearly 7 Mton is manufactured for blast furnaces, 1 Mton for direct reduction, and about 0.3 Mton for steel furnaces. At present all these pellets are of acid composition.

Due to the high alkali content in the gangue, the ore is concentrated to about 1 per cent SiO_2 . About 3 per cent quartzite is then added to pellets made for blast-furnace charging, in order to obtain sufficient pellet strength during reduction.

For a long time the LKAB has been carrying out laboratory tests with pellets containing limestone or dolomite. There are two principal reasons for this:

1. Under certain conditions pellets with basic slag composition have much higher reducibility than acid pellets, while their reduction strength remains constant (or, in the case of pellets for direct reduction, is even improved). Mechanical strength also remains constant, compared to acid pellets.
2. Basic additives are generally of higher value to the blast furnace than quartzite, which otherwise has to be added.

However, recent research concerning basic additives, including two full-scale campaigns, has revealed that dolomite, not limestone, is preferable if good metallurgical properties are desired. In addition to this, the composition of the slag must have a certain CaO/SiO_2 ratio. An account of this research, and the theory resulting from it, will be given in Dr. Thaning's paper.

In September and October, 1974, 200,000 tons of pellets composed in accordance with this theory will be manufactured at LKAB's new straight-grate pellet plant at Malmberget. A table of the chemical analysis as well as data on the mechanical strength of these pellets appears below.

| | |
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| Fe | 66.8 % |
| CaO | 1.4 % |
| MgO | 1.1 % |
| SiO_2 | 1.2 % |
| Al_2O_3 | 0.4 % |
| $\text{Na}_2\text{O} + \text{K}_2\text{O}$ | 0.15 % |
| P | 0.015 % |

Compression strength: about 250 kg, Tumbler Test (ISO): about 95 % + 6.3 mm

It is expected that the metallurgical properties of these dolomite pellets will make them an excellent charge for blast furnaces as well as for direct reduction. Later this year the pellets will be subjected to full-scale reduction tests in two blast furnaces and three different direct reduction plants.