60.3.10.80 Moduli for Raw Meal; kiln feed and clinker (LS; SR and AR)

Description

Calculation of moduli to describe the chemical composition of raw meal, kiln feed and clinker:

- LS: Lime saturation
- SR: Silica ratio
- AR: Alumina ratio

Purpose

Moduli are often the main control parameters for chemical composition of raw meal, kiln feed and clinker. They have a direct impact on the cement performance and product quality as well as the efficiency of the cement manufacturing process. For an interpretation of the moduli see TR – Clinker optimization guideline.

Calculation

The moduli are expressed as ratios of the four main oxides SiO_2, Al_2O_3, Fe_2O_3 and CaO, typically measured by X-ray fluorescence (XRF).

The formulas are applied to raw meal, kiln feed and clinker. Other applications (raw materials, cement) are possible, but need to be interpreted in their context.

$$LS = \frac{100\ CaO}{2.8\ SiO_2 + 1.18\ Al_2O_3 + 0.65\ Fe_2O_3}$$

$$SR = \frac{SiO_2}{Al_2O_3 + Fe_2O_3}$$

$$AR = \frac{Al_2O_3}{Fe_2O_3}$$

Unit of measure:

Dimensionless number

Examples:

	LOI	SiO_2	Al_2O_3	Fe_2O_3	CaO	LS	SR	AR
Clinker A	0.3	21.73	4.16	4.73	64.50	93.7	2.44	0.88
Raw meal	35.02	13.94	2.66	2.89	42.81	97.2	2.51	0.92