Cement Moduli: LSF, Silica Ratio, Alumina Ratio, Hydraulic Modulus

Lime saturation factor (Kühl I and II, with MgO), Kind's lime factor, hydraulic modulus, silica ratio, alumina ratio and silicic acid ratio of clinker or raw mix.

Method: Duda; Cement Data Book; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
CaO	66.470	%
SiO_2	21.270	%
Al_2O_3	6.4900	%
Fe_2O_3	2.7500	%
MgO	1.6900	%

Calculated results

Parameter	Value	Unit
Hydraulic modulus	2.1786	
Silica ratio	2.3019	
Alumina ratio	2.3600	
Silicic acid ratio	3.2773	
Lime standard I (Kühl)	0.93321	
Lime saturation factor (Kühl II, British LSF)	0.96331	
Lime saturation with MgO (up to 2 %)	0.98168	
Kind's lime saturation factor	0.92013	

Notes for this case

- Duda's ranges: hydraulic modulus 1.7–2.3, silica ratio 1.9–3.2 (preferred 2.2–2.6), alumina ratio 1.5–2.5, lime standard 90–95 % for ordinary and 95–98 % for high early strength cement.

Formula and method

$$LSF = \frac{C}{2.8S + 1.18A + 0.65F}, \quad SR = \frac{S}{A+F}, \quad AR = \frac{A}{F}, \quad HM = \frac{C}{S+A+F}, \quad KS_K = \frac{C-(1.65A+0.35F)}{2.8S}$$

Variables

C	CaO	-
S	SiO_2	-
A	Al_2O_3	-
F	Fe_2O_3	-
M	MgO	-
HM	Hydraulic modulus	-
SR	Silica ratio	-
AR	Alumina ratio	-
S/A	Silicic acid ratio	-
$KSt\,I$	Lime standard I (Kühl)	-
LSF	Lime saturation factor (Kühl II, British LSF)	-

LSF_{MgO}	Lime saturation with MgO (up to 2 %)	-
KS_K	Kind's lime saturation factor	-

Method and standards

Cement moduli.

Assumptions and limits

- Oxide analysis on the same basis.

References

- Duda
- Cement Data Book
- Vol. 1
- 3rd ed. (Bauverlag / Macdonald and Evans, 1985)
- secs. 1.7-1.8 (Kühl, Kind)

Report details

Report reference	FCC-5GAW-M7TV (the same inputs always give the same reference)
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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/chemical/cement/cement-moduli-lime-saturation

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.