Bogue Potential Phase Composition of Clinker (C3S, C2S, C3A, C4AF)

Potential clinker phases C3S, C2S, C3A and C4AF from the oxide analysis by Bogue's method, with free lime deducted, and the liquid-forming phases.

Method: Duda; Cement Data Book; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
CaO	66.000	%
SiO_2	21.500	%
Al_2O_3	5.2000	%
Fe_2O_3	3.2000	%
Free lime	1.0000	%

Calculated results

Parameter	Value	Unit
Tricalcium silicate (alite)	61.705	%
Dicalcium silicate (belite)	15.090	%
Tricalcium aluminate	8.3656	%
Tetracalcium aluminoferrite	9.7376	%
Alumina ratio	1.6250	
Aluminate and ferrite phases (flux)	18.103	%

Notes for this case

- Potential, not actual, phase contents: Bogue assumes equilibrium crystallisation and pure phases. Free lime is deducted from CaO; SO_3 and minor oxides are not deducted here.

Formula and method

$$C_3S = 4.071C - 7.600S - 6.718A - 1.430F, \quad C_2S = 2.867S - 0.7544\,C_3S, \quad C_3A = 2.650A - 1.692F, \quad C_4AF = 3.043F$$

Variables

C	CaO	-
S	SiO_2	-
A	Al_2O_3	-
F	Fe_2O_3	-
CaO_f	Free lime	-
C_3S	Tricalcium silicate (alite)	-
C_2S	Dicalcium silicate (belite)	-
C_3A	Tricalcium aluminate	-
C_4AF	Tetracalcium aluminoferrite	-
A/F	Alumina ratio	-
$C_3A + C_4AF$	Aluminate and ferrite phases (flux)	-

Method and standards

Bogue's calculation.

Assumptions and limits

- Equilibrium cooling; pure phases.

References

• Duda
• Cement Data Book
• Vol. 1
• 3rd ed. (Bauverlag / Macdonald and Evans, 1985)
• sec. 1.6 (Bogue)

Report details

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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-bogue-composition

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Reopens the calculator with the inputs of this report.