Concrete Mix Quantities: Cement, Sand and Aggregate

Cement bags, sand, coarse aggregate and water for a volume of concrete from the nominal mix ratio, water–cement ratio and dry volume factor.

Method: Nominal (volume) mix method of site estimation

Input parameters

Unit system: SI

Parameter	Value	Unit
Volume of concrete (wet, in place)	1.0000	m³
Cement parts in the mix ratio	1.0000	
Sand parts	1.5000	
Coarse aggregate parts	3.0000	
Water–cement ratio by mass	0.50000	
Dry volume factor (voids and bulking) Wet concrete needs more loose dry material than its own volume; 1.52 to 1.57 is the usual site allowance.	1.5400	
Bulk density of cement	1,440.0	kg/m³
Mass of one cement bag	50.000	kg

Calculated results

Parameter	Value	Unit
Dry volume of materials	1.5400	m³
Cement	403.20	kg
Cement bags	8.0640	
Sand	0.42000	m³
Coarse aggregate	0.84000	m³
Water	201.60	kg

Notes for this case

- Order 9 whole bags.
- A nominal (volume) mix for estimating. Structural concrete grades need a design mix and site trials to the code you work to; add wastage separately.

Formula and method

$$V_d = f_d V$$

$$m_c = V_d \frac{c}{c+s+a}\rho_c, \quad N_b = m_c / m_b$$

$$V_s = V_d \frac{s}{c+s+a}, \quad V_a = V_d \frac{a}{c+s+a}, \quad m_w = (w/c)\, m_c$$

Variables

V	Volume of concrete (wet, in place)	m³
c	Cement parts in the mix ratio	-
s	Sand parts	-
a	Coarse aggregate parts	-
w/c	Water–cement ratio by mass	-

f_d	Dry volume factor (voids and bulking)	-
ρ_c	Bulk density of cement	kg/m³
m_b	Mass of one cement bag	kg
V_d	Dry volume of materials	m³
m_c	Cement	kg
N_b	Cement bags	-
V_s	Sand	m³
V_a	Coarse aggregate	m³
m_w	Water	kg

Method and standards

The nominal volume mix: the dry volume of loose materials is shared in the mix ratio; cement is converted to mass with its bulk density and water follows from the water–cement ratio.

Assumptions and limits

- Nominal volume mix; no admixtures.
- Wastage not included. The bag count is fractional; a note gives the whole bags to order.

References

- Nominal (volume) mix method of site estimation

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/civil/concrete/concrete-nominal-mix-quantities

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.