Ferroalloy Addition to Reach an Aim Composition

Mass of ferroalloy to raise an element in a steel heat from its current to its aim content, from the alloy's element content and recovery, with cost.

Method: Alloy addition mass balance

Input parameters

Unit system: SI

Parameter	Value	Unit
Liquid steel mass	120.00	t
Current content	0.40000	%
Aim content	1.2000	%
Element content of the ferroalloy	75.000	%
Recovery (yield) of the element	92.000	%
Ferroalloy price per kg	1.4000	

Calculated results

Parameter	Value	Unit
Ferroalloy addition	1,415.9	kg
Element dissolved	976.99	kg
Element lost to slag and fume	84.956	kg
Addition cost	1,982.3	

Notes for this case

• Element balance including the added mass: (m_s + m_FA)c_1 = m_sc_0 + m_FA·f·η, so m_FA = m_s(c_1 − c_0)/(fη − c_1). For small additions this is close to m_s(c_1 − c_0)/(fη). Recovery depends on the element's affinity for oxygen, slag condition and the addition practice (Mn about 85–95 %, Si 70–90 %, Ti and B lower).

Formula and method

$$m_{FA} = \frac{m_s(c_1 - c_0)}{f\eta - c_1}$$

Variables

m_s	Liquid steel mass	kg
c_0	Current content	-
c_1	Aim content	-
f	Element content of the ferroalloy	-
η	Recovery (yield) of the element	-
p	Ferroalloy price per kg	-
m_{FA}	Ferroalloy addition	kg
m_e	Element dissolved	kg
m_{lost}	Element lost to slag and fume	kg
C	Addition cost	-

Method and standards

Alloy addition.

Assumptions and limits

- Uniform mixing; constant recovery.

References

Alloy addition mass balance

Report details

Report reference	FCC-9AKM-WY00 (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/materials/steelmaking-foundry/ferroalloy-addition

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.