List of a Ship from Loading an Off-Centre Weight

New displacement, KG, GM and the resulting angle of list when a weight is loaded off the centreline, by taking moments about the keel and centreline.

Method: List by transverse moments about the centreline

Input parameters

Unit system: SI

Parameter	Value	Unit
Displacement before loading	9,000.0	t
KG before loading	7.2000	m
KM at the new draught	8.1000	m
Weight loaded	120.00	t
Height of the weight above the keel	12.000	m
Transverse distance off the centreline	6.0000	m

Calculated results

Parameter	Value	Unit
New displacement	9,120.0	t
New KG	7.2632	m
New GM	0.83684	m
Angle of list	5.3893	°
Transverse shift of G	78.947	mm

Notes for this case

• tan θ = GG_1/GM' with GG_1 = w d/Δ'. Small angles (below about 10°); KM is taken at the new draught. Lifting with a ship's derrick acts at the derrick head, not where the cargo sits.

Formula and method

The formula is shown on the calculator page: https://calc.firecad.com/mechanical/marine/ship-list-angle

Variables

Δ	Displacement before loading	kg
KG	KG before loading	m
KM	KM at the new draught	m
w	Weight loaded	kg
kg_w	Height of the weight above the keel	m
d	Transverse distance off the centreline	m
\Delta'	New displacement	kg
KG'	New KG	m
GM'	New GM	m
θ	Angle of list	rad
GG_1	Transverse shift of G	m

Method and standards

Moments of weights for list.

Assumptions and limits

- Small angles, KM constant over the draught change.

References

List by transverse moments about the centreline

Report details

Report reference	FCC-APDK-NJNR (the same inputs always give the same reference)
Generated	23 November 2026, 18:00 UTC
Calculator	List of a Ship from Loading an Off-Centre Weight
Method last reviewed	17 November 2026
Software release	FireCAD Calc, release of 22 November 2026
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/mechanical/marine/ship-list-angle

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.