Sling angle and crane capacity formula sheet

Built from our sling angle factor, gross vs net capacity, crane capacity deductions and load chart guides. Every number in the checks is invented for practice.

Our own one-page summary of the sling and load chart arithmetic in four of our guides. Work each check by hand, then confirm it with the calculator named beside it.

- Angles are measured from horizontal. If your tag or reference measures from the vertical, the factor is 1 / cos instead.
- Keep pounds beside every number. A boom length or a radius in feet has no place in the sum.
- The chart's own notes, the sling's tag and your qualified person control. These are arithmetic checks, not lift approval.

Sling legs

Sling angle factor and leg tension (two equal legs, hook above the center of gravity)

factor = 1 / sin(angle from horizontal)

leg share = load / 2; leg tension = share x factor

factors: 75 degrees 1.035, 60 degrees 1.155, 45 degrees 1.414, 30 degrees 2.000

Check: 10,000 lb load, share 5,000 lb: 60 degrees 5,000 x 1.155 = about 5,775 lb per leg; 30 degrees 5,000 x 2.000 = 10,000 lb per leg

Open in calculator: boomangle.com/tools/sling-angle-calculator

Load chart arithmetic

Net capacity after deductions

total deductions = hook block + all rigging + any attachment deduction the chart notes list

net capacity = gross capacity - total deductions (add first, subtract once). The load is not a deduction.

Check: chart PC-1, gross 19,500 lb, block 750 lb, rigging 400 lb: deductions 1,150 lb, net 18,350 lb

Open in calculator: boomangle.com/tools/net-capacity-calculator

Percent of capacity

percent of net = load / net capacity x 100. Get net from the net capacity calculator.

A different figure: percent of gross = (load + every deduction) / gross capacity x 100. The percent of capacity calculator uses this one. Do not put the load alone over gross.

Check: Practice A, gross 24,000 lb, deductions 600 + 800 + 400 = 1,800 lb, net 22,200 lb: 20,000 / 22,200 x 100 = 90.1% of net. On gross: 21,800 / 24,000 x 100 = 90.8%

Open in calculator: boomangle.com/tools/crane-percent-of-capacity-calculator

Sources

Sling angle factor: OSHA 29 CFR 1926.251 and the OSHA alloy chain sling guidance; DOE Hoisting and Rigging Fundamentals, TR244C. Capacity deductions: OSHA 29 CFR 1926.1417 and the CCO Mobile Crane Operator Candidate Handbook, 01/25 revision. Worked arithmetic is ours.

Read next

Sling angle factor guide, with the worked example: boomangle.com/guides/sling-angle-factor

Gross vs net capacity: boomangle.com/guides/gross-vs-net-capacity

Crane capacity deductions: boomangle.com/guides/crane-capacity-deductions

How to read a crane load chart: boomangle.com/guides/how-to-read-a-crane-load-chart

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