BOOMCHECK · NCCCO MOBILE CRANE OPERATOR

The Ultimate Crane Load Chart & Clearance Cheat Sheet

Tape this to the inside of the cab door.

1 Power Line Clearance, Table A

Minimum clearance while working near an energised line. It applies to any part of the equipment, the load line or the load, rigging included. A line is presumed energised until the utility confirms it is deenergised and visibly grounded at the worksite. Without the voltage, keep 20 ft, or 50 ft from a line over 350 kV.

NOMINAL VOLTAGE (KV, AC)	MINIMUM CLEARANCE
Up to 50	**10 ft**
Over 50 to 200	**15 ft**
Over 200 to 350	**20 ft**
Over 350 to 500	**25 ft**
Over 500 to 750	**35 ft**
Over 750 to 1,000	**45 ft**
Over 1,000	**Set by the utility or a registered PE**

Source: 29 CFR 1926.1408 Table A, 1926.1409

2 Load Angle Factors

Multiply a leg's share of the load by the factor for the angle it hangs at. Each is one divided by the sine of the angle. Learn 30, 45, 60 and 90: they come up again and again.

ANGLE TO HORIZONTAL	INCLUDED ANGLE AT THE HOOK	LOAD ANGLE FACTOR
90°	**0°**	**1.000**
75°	**30°**	**1.035**
60°	**60°**	**1.155**
53°	**74°**	**1.252**
45°	**90°**	**1.414**
40°	**100°**	**1.556**
35°	**110°**	**1.743**
30°	**120°**	**2.000**
Below 30°	**Over 120°**	**Off the rating chart**

Source: Trigonometry. Factor = 1 / sin(angle)

3 Typical Allowable Ground Bearing Pressure

Planning values only. What your site will carry comes from a geotechnical report or the controlling entity, which under 29 CFR 1926.1402 must provide ground adequate to support the crane.

GROUND	TYPICAL ALLOWABLE	SAME IN PSI
Soft or wet clay, fill, marsh	**1,000 psf**	**7 psi**
Medium clay	**2,000 psf**	**14 psi**
Loose sand or gravel	**2,000 psf**	**14 psi**
Firm clay	**3,000 psf**	**21 psi**
Compacted fill	**3,000 psf**	**21 psi**
Dense sand or gravel	**4,000 psf**	**28 psi**
Hardpan	**8,000 psf**	**56 psi**
Sedimentary rock	**20,000 psf**	**139 psi**
Sound bedrock	**40,000 psf**	**278 psi**

Source: Typical published planning values. Not site specific.

4 Boom Angle Factors

Radius uses the cosine and height uses the sine: multiply the boom length by the factor. Know 30, 45 and 60 degrees by heart.

BOOM ANGLE	COSINE, FOR RADIUS	SINE, FOR HEIGHT
0°	**1.000**	**0.000**
15°	**0.966**	**0.259**
30°	**0.866**	**0.500**
40°	**0.766**	**0.643**
45°	**0.707**	**0.707**
50°	**0.643**	**0.766**
60°	**0.500**	**0.866**
70°	**0.342**	**0.940**
75°	**0.259**	**0.966**
80°	**0.174**	**0.985**

Source: Trigonometry. Radius = length x cos, height = length x sin

5 Weight and Length Conversions

A metric tonne is about 10% heavier than a US ton. Reading one as the other hands you capacity the crane does not have.

FROM	TO	MULTIPLY BY
US tons	**Pounds**	**2,000**
Kips	**Pounds**	**1,000**
Metric tonnes	**Pounds**	**2,204.62**
Metric tonnes	**US tons**	**1.1023**
Kilograms	**Pounds**	**2.20462**
Feet	**Metres**	**0.3048**
Metres	**Feet**	**3.28084**
Inches	**Millimetres**	**25.4**
psi	**psf**	**144**
Degrees	**Percent grade**	**tan(angle) x 100**

Source: Unit definitions

> **Between two chart rows, work to the next longer radius, and between two boom lengths to the lower capacity of the two. Never interpolate up.**

Doing this by hand on site?

- Net capacity with every deduction taken off the chart figure, and the working shown
- Outrigger pad pressure against the ground you are set up on
- The pre-shift inspection: all 14 items, with the paragraph behind each one
- 497 crane operator practice questions, free in your browser, and it works offline once opened

xernaitech.com/boomcheck

A study and field aid. Check every figure against the crane's own load chart, its manual and the site's own procedures before you rely on it.