Cable Lay Length

How-to guide: what the workbook does, how to use it and what every number means. mfgcalcs.com

Cable Lay Length

Set up every stranding and cabling layer: lay length from the layer diameter and lay ratio, the ratio against your specification, and the lay angle, take-up and cage speed.

For: Process engineers, setters and quality engineers in wire and cable plants, and harness makers who specify stranded and cabled constructions.

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Quick start

1. On Setup, type your plant name.
2. On Layers, give each layer of each construction a row: lay direction, complete layer diameter, element diameter, specified lay ratio, the specification's limits and the line speed.
3. Fix anything the Check column names.
4. Open the Dashboard: layers outside their lay ratio limits, the largest take-up and the cage speed each layer needs.

What is in the workbook

Start Here	Read this first: what the workbook does and how to use it.
Setup	Plant name. Every dimension on Layers is in millimetres; lay length is also shown in inches.
Layers	One row per stranding or cabling layer: diameter and lay ratio in; lay length, ratio status, lay angle, take-up and cage speed out.
Dashboard	Lay ratio against the specification, lay length, take-up and the cage speed every layer needs.
Method	How every number is calculated, with assumptions, limits and sources.
Verify	Self-check: the workbook's formulas recomputed on fixed inputs against an independent reference.

What each number means

Quantity	How it is calculated	Units
Lay length	Complete layer diameter x lay ratio.	mm
Lay length (in)	Lay length / 25.4 (exact).	in
Revolutions per metre	1,000 / lay length in mm.	turns/m
Ratio status	Out of limits below the minimum or above the maximum lay ratio; Within limits otherwise; blank without limits.	-

Quantity	How it is calculated	Units
Pitch diameter	Layer diameter - element diameter (the circle through the element centres).	mm
Lay angle	atan(pi x pitch diameter / lay length), in degrees from the cable axis.	deg
Take-up	sqrt(1 + (pi x pitch diameter / lay length)^2): element length per unit length of cable.	x
Element per km	1,000 x take-up: metres of each element per km of cable.	m/km
Cage speed	Line speed (m/min) x 1,000 / lay length (mm).	rpm

Assumptions, limitations, sources and the self-check (the Verify sheet, which recomputes the workbook's formulas on fixed test inputs) are in the workbook. The last page shows the Dashboard with the example data for Northfield Cable, a fictional business.

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Engineering estimates for planning and improvement work. Verify the results against your own process, data and standards before you rely on them.

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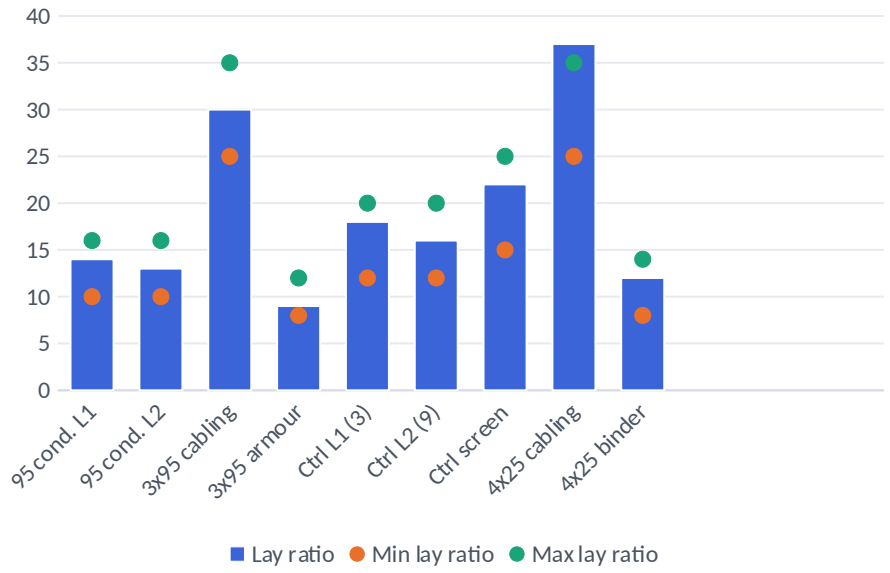
Lay ratio against the specification, lay length, take-up and the cage speed every layer needs.

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Northfield Cable (example): 9 layers of 4 constructions. Dimensions in mm.

LAYERS	LAYERS OUT OF LAY RATIO LIMITS	LARGEST TAKE-UP	HIGHEST CAGE SPEED (RPM)
9	**1**	**5.31%**	**1,142.9**
Every row of Layers	Ratio status Out of limits	Extra element length over cable length	Line speed x 1,000 / lay length

Lay ratio against the specification



Cage speed by layer (rpm)

