



# SPC Tools for Excel

Control charts and capability with visible formulas, checked against a textbook example.

## What's inside

| File                       | What it is / how to use it                                                                                                                                                               |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 01_SPC_Tools_Workbook.xlsx | X-bar & R (25 subgroups, n 2-10), I-MR (100 points), p-chart with varying n, Cp/Cpk/Pp/Ppk with expected ppm, Western Electric rules 1-4 flagged automatically, constants table, charts. |

## Which chart?

| Data                                                | Chart     |
|-----------------------------------------------------|-----------|
| Measurements in subgroups (e.g., 5 parts each hour) | X-bar & R |
| One measurement at a time (slow processes, batches) | I-MR      |
| Pass/fail counts, sample size can vary              | p-chart   |

## Western Electric rules

1: a point beyond 3 sigma. 2: 2 of 3 beyond 2 sigma, same side. 3: 4 of 5 beyond 1 sigma, same side. 4: 8 in a row on one side. A flag means look for a special cause.

## Capability calls

Cpk 1.33 is the common minimum; many aerospace and automotive customers want 1.67 for key characteristics. Cp/Cpk use within-subgroup sigma (short term); Pp/Ppk use overall standard deviation (long term). A big gap between Cpk and Ppk means the process drifts between subgroups.

## How the formulas were checked

Before release, the workbook was recalculated in a spreadsheet engine and compared with a separate Python calculation on four datasets, including the well-known orange-juice-can p-chart example from Montgomery's *Introduction to Statistical Quality Control* (p-bar 0.2313, UCL 0.4102, LCL 0.0524, samples 15 and 23 out of control). Every value and every Western Electric flag matched.

## About the author

Built by Matt Norman, US Navy veteran and former SpaceX Falcon 9 quality inspector and QA supervisor. (Not affiliated with or endorsed by SpaceX.) Norman Quality Tools is Veteran-Owned & Operated. Contains no SpaceX, government, or customer proprietary information; all example data is made up.

## License

One company license: use and edit at all sites of the purchasing company. Do not resell or redistribute. Works with Word/Excel 2016+, Microsoft 365, LibreOffice; no macros. Norman Quality Tools (Veteran-Owned & Operated), 600 W Santa Ana Blvd, Ste 114-A3064, Santa Ana, CA 92701. Support: [normanqualitytools.com/support.html](https://normanqualitytools.com/support.html)

SPC Tools for Excel v1, Rev A (2026-10). Independent guidance. Not affiliated with or endorsed by AIAG, SAE International, IAQG, ISO, or any current or former employer of the author. Standard clause numbers are for navigation only; buy standards from their publishers. Not legal advice; does not guarantee certification or approval. © 2026 Norman Quality Tools. All rights reserved. Licensed for use within the purchasing company; do not resell or redistribute.