CYES SILICONE

Cpk, Reported Honestly

An In-House Process Capability Dataset and Engineering Report (2026)

Technical Whitepaper | Original measured dataset | Version 1.0

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Five desensitized in-house process-capability (Cpk) studies, measured 1.24 to 1.68 against the common 1.33 target, released as a five-study summary CSV with sample sizes, measurement conditions and the three below-target results published unchanged.

Read this before quoting any number.

Single-factory in-house measurements. This is not an industry benchmark, industry average, or a survey of other manufacturers. Blank CSV cells mean "not released (NDA)", not zero and not "passed".

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Stable reference: https://www.cyesltd.com/research/cpk-process-capability-report-2026.html
Data file: https://www.cyesltd.com/data/cpk-process-capability-studies.csv
This PDF: https://www.cyesltd.com/assets/docs/cyes-cpk-whitepaper-2026-v1.0.pdf

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About this document

Version 1.0, 22 November 2026. All figures are transcribed from the CSV and from measurement-system data already published on cyesltd.com. No new data was collected and no value was extrapolated for this report.

1. Executive summary

Seven conclusions, each stated with its full scope so it can be quoted on its own. Every figure below comes from the downloadable CSV or from measurement-system data already published on our site.

- Five desensitized in-house Cpk studies are published as a five-study summary CSV, measured 1.24, 1.27, 1.32, 1.34 and 1.68 against the common 1.33 target. The CSV holds study-level results, not raw per-piece measurements; those are released under NDA.
- Three of five studies (1.24, 1.27, 1.32) sit below 1.33 and are published as measured - no rounding up, no omission.
- Two studies (1.34, 1.68) sit above 1.33; LSR-MED-018 also reports Cp 1.74 at n=125.
- Published sample sizes are n=100 (LSR-MED-007), n=50 (FVMQ-SEAL-010), n=125 (LSR-MED-018), n=80 (LSR-MED-011) and n=70 (HTV-GASKET-014); all five studies carry a published sample size.
- The long-term pooled Cpk reported across our capability program is 1.27, with a continuous 10-batch SPC trace.
- Measurement-system MPE is <= (3+L/200) um in X/Y and <= (5+L/200) um in Z (L in mm) at 20 +/-2 degC - instrument capability, not part tolerance.
- The dataset covers April-October 2026, one factory in Dongguan, China, and is released as v1.0 under CC BY 4.0.

2. Why we publish the studies that missed 1.33

A capability study is a measurement, not a marketing claim. Cpk 1.33 is a widely used convention for a stable, centered process; it is not a rule that every characteristic on every part must clear. When a study comes back at 1.24 or 1.32, the honest options are to report it, to investigate the process, and to keep the result in the record - not to round it to 1.33 or quietly drop it from the sample.

That is why all five studies appear in the CSV, including the three below target. A supplier who shows only passing studies is showing you a selected sample rather than the process. For a buyer, the more useful question is not "do you have any Cpk above 1.33?" but "will you show me the study design, the sample size, the measurement system, and the results that did not pass?"

3. The dataset at a glance

Every row below is transcribed from the downloadable CSV. Blank cells in the source file are shown as a dash and are not imputed. A dash means "not released (NDA)", not zero and not "passed".

Study ID	Product family	Characteristic	Specification	n / Cpk	Date
LSR-MED-007	Medical LSR diaphragm seal	Inner diameter (seal lip)	8.00 mm +/-0.02 mm	100 / 1.24	2026-04-16
FVMQ-SEAL-010	FVMQ turbocharger static seal	Seal lip thickness	1.20 mm +/-0.05 mm	50 / 1.32	2026-08-20

Study ID	Product family	Characteristic	Specification	n / Cpk	Date
LSR-MED-018	Medical LSR component	Dimension / hardness / visual	Customer specification	125 / 1.68	2026-10-14
LSR-MED-011	Medical LSR valve diaphragm	Critical orifice diameter	Customer specification	80 / 1.27	2026-06-11
HTV-GASKET-014	HTV solid-silicone compression gasket	Nominal wall	2.00 mm	70 / 1.34	2026-09-15

Status against the 1.33 target: LSR-MED-007, FVMQ-SEAL-010 and LSR-MED-011 are below target and published as measured; LSR-MED-018 and HTV-GASKET-014 are above target. The file is UTF-8 CSV with a byte-order mark, one header row and five data rows; Cpk and Cp are dimensionless, dimensions are in mm, dates are ISO 8601.

4. Field dictionary

Eleven columns. The same definitions apply to the CSV, the landing page and this report.

Column	Meaning	Definition / units	Missing values
study_reference	Study ID	Desensitized identifier, e.g. LSR-MED-007	Never blank
product	Part description	Generic product family, no customer names	Never blank
process	Molding process	LSR injection, FVMQ molding, compression molding...	Never blank
measured_characteristic	Characteristic	The dimension or attribute that was measured	Never blank
specification	Specification	Nominal value and tolerance, or 'Customer specification'	Never blank
sample_size_n	Sample size (n)	Number of measured parts in the study	Blank = not released (NDA)
cpk	Cpk	Measured process capability index, published as measured	Never blank
cp	Cp	Process capability ignoring centering	Blank = not recorded / NDA
measurement_equipment	Measurement equipment	Instrument or validation-report reference	Blank = not released (NDA)
test_date	Test date	ISO date of the study	Blank = not released (NDA)
status_vs_1_33_target	Status vs 1.33	Whether the result sits above or below the 1.33 target	Blank = not recorded in source extract

5. Methodology & measurement system

- Measurement: non-contact optical measurement for LSR-MED-007; validation reports held under

NDA for FVMQ-SEAL-010 and LSR-MED-018. Dimensional measurement uses an SMV-3020 CNC video measuring machine with MPE <= (3+L/200) um (X/Y) and <= (5+L/200) um (Z), plus HEXAGON Global S, ZEISS SPECTRUM and ZEISS CONTURA CMMs, a CLD8 universal testing machine and an LX-A Shore A durometer, at 20 +/-2 degC with minimal re-fixturing.

- Cpk definition: Cpk = min[(USL - mu) / 3sigma, (mu - LSL) / 3sigma]; Cp = (USL - LSL) / 6sigma. Cp is reported only where it was recorded in the source extract.
- Sampling: measured production parts, sample sizes stated per study where publishable (n=100 / 50 / 125). We do not substitute a target value for a measured one.
- Desensitization: customer names, part numbers, drawing numbers, prices and order values are removed. Study IDs are internal references, not customer identifiers.

6. Findings

Three studies (1.24, 1.27, 1.32) sit below 1.33 and two (1.34, 1.68) above it. The long-term pooled Cpk reported across our capability program is 1.27, with a continuous 10-batch SPC trace - a figure that is lower than the best single study because it includes the variation across lots rather than a single favorable run.

Two distinctions matter when reading any supplier's capability claim. First, Cpk is a property of a process and a characteristic, not of a factory as a whole: one study on an 8.00 mm seal lip says nothing directly about a different part. Second, the advertised "+/-0.008 mm" is mold-cavity machining accuracy on steel, not the tolerance of a molded silicone part. General molded-silicone parts typically hold +/-0.1-0.3 mm; tighter values such as +/-0.02-0.05 mm apply only to restricted critical dimensions after DFM review. Measurement uncertainty (the MPE above) must also be smaller than the tolerance being claimed, or the number is not verifiable.

7. How to read a supplier's Cpk claim

1. Ask for the study, not just the number: which characteristic, which specification limits, which sample size and which date.
2. Ask what measurement system produced it and what its MPE is; an instrument capability larger than the claimed tolerance makes the claim untestable.
3. Ask whether the figure refers to a mold cavity, a first article, or series production parts.
4. Ask whether DFM review restricted the critical dimensions, and under which material hardness and nominal size range.
5. Ask to see the results that did not pass. A distribution of studies is more informative than a single best value.
6. Confirm the supporting chain: FAI report, calibration records, Gage R&R and PPAP documentation where applicable.

8. Limitations

- Single factory: all records come from CYES SILICONE's own production lines in Dongguan, China. This is not an industry benchmark, industry average, or survey of other manufacturers.
- Time window: studies run from 2026-04-16 to 2026-10-14; all five have a published test date.
- NDA constraints: customer identifiers and some validation details are withheld; blank CSV

cells mean "not released", not zero and not "passed".

- Sample size: all five studies have a published n (50-125); no confidence interval is offered because per-piece raw data remain under NDA.
- Assumptions: Cpk assumes an approximately normal, statistically stable process; a value below target is a signal to investigate, not a prediction of defect rate for a different part.
- Conditions: measurements were taken under the stated temperature and equipment conditions; results are not transferable to a different measurement system without re-verification.

9. License, version & changelog

This dataset and this report are released under Creative Commons Attribution 4.0 International (CC BY 4.0). You may share and adapt them, including commercially, provided you give appropriate credit to CYES SILICONE, provide a link to the license, and indicate if changes were made.

Version	Date	Change
v1.0	2026-11-22	Initial public release: 5 studies, 11 fields, desensitized CSV, CC BY 4.0. No values revised.

The CSV URL https://www.cyesltd.com/data/cpk-process-capability-studies.csv is the stable v1.0 download. If the dataset is revised, the version number will increment, a new changelog row will be added, and the previous version will remain available for existing citations.

10. How to cite

> CYES SILICONE (2026). Cpk, Reported Honestly: An In-House Process Capability Dataset, v1.0. CYES SILICONE, Dongguan, China. https://www.cyesltd.com/research/cpk-process-capability-report-2026.html. Dataset: https://www.cyesltd.com/data/cpk-process-capability-studies.csv. License: CC BY 4.0 (attribution required). Single-factory in-house measurements; not an industry benchmark. Accessed YYYY-MM-DD.

Replace YYYY-MM-DD with your access date. Cite the landing page as the stable reference and the CSV URL as the data file. Attribution to CYES SILICONE is required by the CC BY 4.0 license.

11. FAQ

Q. Why would a silicone manufacturer publish Cpk results below the 1.33 target?
A. Because a capability study is a measurement, not a marketing claim. Three of our five published studies (Cpk 1.24, 1.27 and 1.32) fall below the common 1.33 target, and we publish them as measured rather than rounding up or omitting them. A supplier who only shows passing studies is showing a selected sample, not the process.

Q. Is Cpk 1.33 a mandatory pass/fail threshold for every silicone part?
A. No. 1.33 is a widely used convention for a stable, centered process under statistical control, not a universal contractual requirement. The applicable target depends on the characteristic, the customer specification and the risk class of the part. We state the target used (1.33) and the measured value separately so both can be judged.

Q. What sample sizes were used in these Cpk studies?

A. Where publishable, sample sizes are given per study: n=100 (LSR-MED-007), n=50 (FVMQ-SEAL-010) and n=125 (LSR-MED-018). Two studies carry no sample size in the public CSV because the underlying validation reports are covered by NDA. A blank cell means 'not released', not zero.

Q. Are these Cpk values an industry benchmark?

A. No. They are in-house measurements from a single factory's production lines in Dongguan, China, between April and October 2026. They do not represent an industry distribution, an industry average, or a survey of other manufacturers.

Q. What equipment produced the measurements?

A. LSR-MED-007 used non-contact optical measurement; FVMQ-SEAL-010 and LSR-MED-018 reference validation reports held under NDA. Our dimensional measurement system uses an SMV-3020 CNC video measuring machine (MPE <= (3+L/200) um in X/Y, <= (5+L/200) um in Z), HEXAGON Global S, ZEISS SPECTRUM and ZEISS CONTURA CMMs, a CLD8 universal testing machine and an LX-A Shore A durometer, at 20 +/-2 degC.

Q. Can I reuse the dataset in my own article or analysis?

A. Yes. The dataset is released under CC BY 4.0: you may share and adapt it, including commercially, provided you give appropriate credit to CYES SILICONE, link the license and indicate if changes were made. A ready-made citation is provided on this page.

Q. Why are some CSV fields blank?

A. Blank cells are deliberately not imputed. Cp, sample size, measurement equipment, test date and status are blank where the source validation report is under NDA or where the field was not recorded in the desensitized extract. We do not fill gaps with estimates.

Q. How should I cite this dataset?

A. Use the ready-made v1.0 citation on this page. Cite the landing page as the stable reference and the CSV URL as the data file, note the CC BY 4.0 license, and add your access date.

Q. What is the difference between a mold-cavity tolerance and a part tolerance?

A. +/-0.008 mm refers to mold-cavity machining accuracy on steel, not to the dimension of a molded silicone part. General molded-silicone parts typically hold +/-0.1-0.3 mm; tighter values such as +/-0.02-0.05 mm apply only to restricted critical dimensions after DFM review. Confusing the two is the most common way a tolerance claim is overstated.

Q. What is Cp, and why is it blank for most studies?

A. Cp = (USL - LSL) / 6sigma measures potential capability while ignoring centering; Cpk = min[(USL - mu) / 3sigma, (mu - LSL) / 3sigma] also accounts for where the process sits. Cp is reported only where it was recorded in the source extract: LSR-MED-018 records Cp 1.74 at n=125. Blank Cp cells are not imputed with estimates.

Q. Does a Cpk below 1.33 mean those parts were defective?

A. No. Cpk is a process-capability index for one characteristic under stated measurement conditions, not a defect-rate prediction for a part or an order. A value below target is a signal to investigate the process, not evidence that shipped parts failed. We publish the measured value and do not convert it into a defect claim.

Q. Why is the long-term pooled Cpk (1.27) lower than the best single study (1.68)?
A. A single study describes one characteristic on one run. The pooled figure across our capability program includes variation between lots and the continuous 10-batch SPC trace, so it is lower than the best single study. We publish both rather than quoting only the most favorable value.

12. Related reading & contact

- Landing page (stable reference): https://www.cyesltd.com/research/cpk-process-capability-report-2026.html
- Source dataset CSV: https://www.cyesltd.com/data/cpk-process-capability-studies.csv
- Engineering evidence: https://www.cyesltd.com/engineering-evidence.html
- Quality documents (FAI, calibration, Cpk records): https://www.cyesltd.com/quality-documents.html
- Testing & measuring equipment (named instruments and MPE): https://www.cyesltd.com/testing-measuring-equipment.html

For the underlying validation reports or a capability study on your own part, send your drawing, characteristic and compliance needs via https://www.cyesltd.com/get-a-quote.html. Sensitive validation documents are provided under NDA.