

System Prerequisite

- 64-bit Windows

Installation

- Install the executable file *Sample_Size_Calc.exe* in your system. **Ignore/approve any warning messages during the installation process.**

Definitions

- **Alpha Risk:** the probability that a good design is falsely rejected as bad. May also be referred to as Significance, Type I Error, or Producer Risk.
- **Beta Risk:** the probability that a bad design is falsely accepted as good. May also be referred to as Type II Error or Consumer Risk.

Sample Size Calculation Steps

- Start the tool. Steps to be done for sample size calculation are provided below in sequential order.

Sample Size Calculator (For Windows 64-bit) // vivek.silwal

Clear one-tailed two-tailed

alpha risk

beta risk

stdev (historical)

margin (difference_to_detect)

Calculate Calculate

z-test

minimum sample size for one-tailed test

minimum sample size for two-tailed test

t-test

minimum sample size for one-tailed t-test

minimum sample size for two-tailed t-test

Pass/Fail test

sample size for attribute data test

Historical Data

Calculate

[x1,x2,x3...] [mean] [stdev]

Margin of Safety

Calculate

[spec] [margin]

Calculate

[U.L spec] [L.L spec] [margin]

Last Update : Feb 24, 2023

- Select 1-tailed or 2-tailed test.

1-tailed example

Sound Level

Historical sample test data: 54 dBA, 49 dBA, 51 dBA etc.

Requirement Spec: 54 dBA

2-tailed example

Average Cabinet Temperature

Historical sample test data: 5.2C, 4.7C, 4.9C etc.

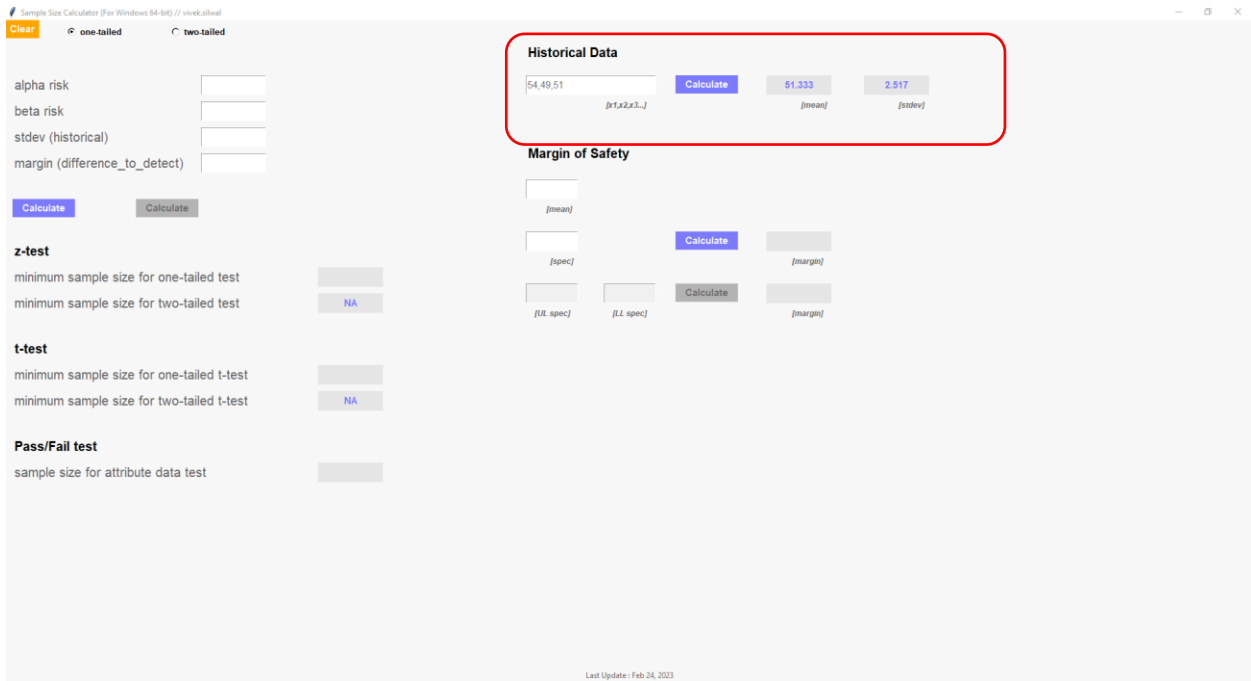
Requirement Spec: 4.5C to 5.5C range (i.e $\pm 0.5C$ of setpoint of 5C)

The screenshot shows a web-based statistical calculator interface. At the top left, there is a 'Clear' button and two radio buttons: 'one-tailed' (which is selected) and 'two-tailed'. Below these are input fields for 'alpha risk', 'beta risk', 'stdev (historical)', and 'margin (difference_to_detect)', each with a 'Calculate' button. The main area is divided into three sections: 'z-test', 't-test', and 'Pass/Fail test'. The 'z-test' section shows 'minimum sample size for one-tailed test' as 'NA' and 'minimum sample size for two-tailed test' as 'NA'. The 't-test' section shows 'minimum sample size for one-tailed t-test' as 'NA' and 'minimum sample size for two-tailed t-test' as 'NA'. The 'Pass/Fail test' section shows 'sample size for attribute data test' as 'NA'. On the right side, there are sections for 'Historical Data' and 'Margin of Safety'. The 'Historical Data' section has a 'Calculate' button and a '[spec]' field. The 'Margin of Safety' section has a 'Calculate' button and a '[margin]' field. At the bottom, it says 'Last Update : Feb 24, 2023'.

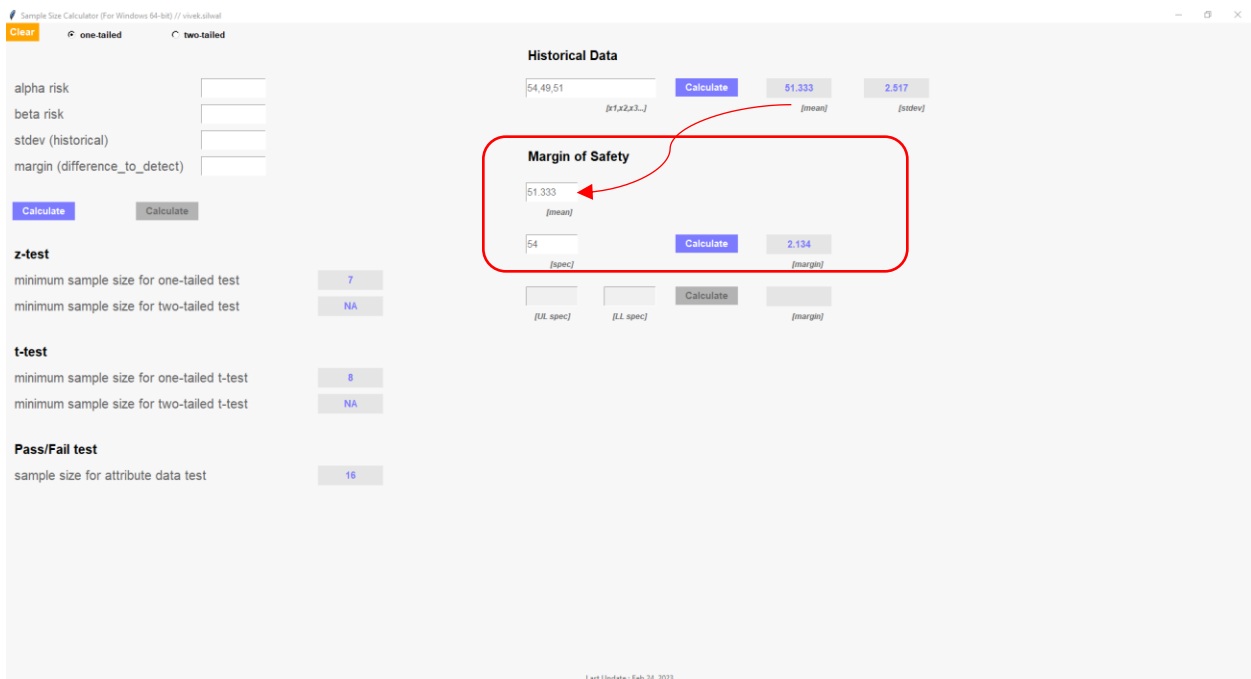
- Calculate the historical mean and historical standard deviation for the test results from Prototype or Alpha evaluation.

For E.g.

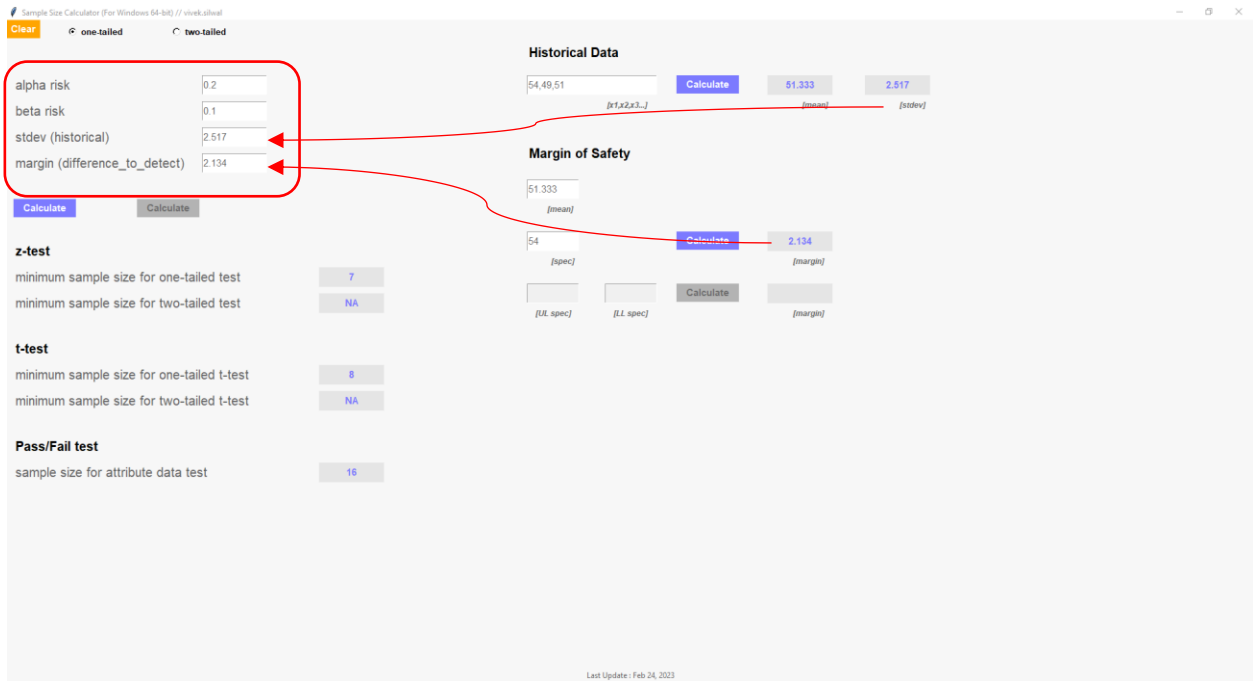
Historical data for 3 samples tested for “sound level” provided results as 54 dBA, 49 dBA, 51 dBA against the requirement spec of 52 dBA. *(1-tailed test)*



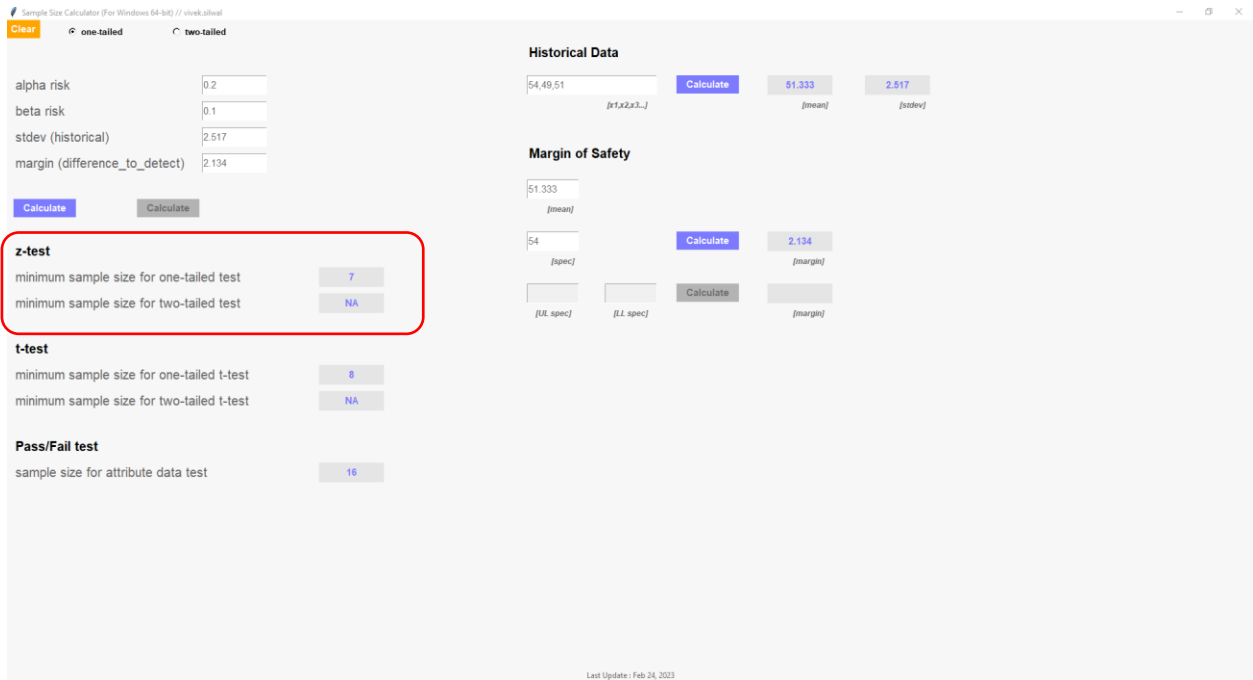
- Use the calculated historical mean data to find the margin of safety. Below image shows the margin of safety calculation for 1-tailed test. For 2-tailed test case, Upper Spec/limit (UL) and Lower Spec/Limit (LL) would need to be entered for margin of safety calculation.



- The final step would be calculating the sample size for a predefined alpha and beta risk associated with that test (For E.g. For Sound Level, the risk of harm would be Level 1. Hence the values of Alpha, Beta are 0.2 and 0.1 to be used for this test.



- Sample size data is calculated as per Z-test.



- For more conservative Sample size, results as per t-test could also be used.

Sample Size Calculator (For Windows 64-bit) // vivtek,allreal

Clear one-tailed two-tailed

alpha risk 0.2
 beta risk 0.1
 stdev (historical) 2.517
 margin (difference_to_detect) 2.134

Calculate Calculate

z-test
 minimum sample size for one-tailed test 7
 minimum sample size for two-tailed test NA

t-test
 minimum sample size for one-tailed t-test 8
 minimum sample size for two-tailed t-test NA

Pass/Fail test
 sample size for attribute data test 16

Historical Data
 54,49,51 [1,xx,x3...] Calculate 51,333 [mean] 2,517 [stdev]

Margin of Safety
 51,333 [mean] Calculate 2,134 [margin]
 54 [spec] [margin]
 [UL spec] [LL spec] Calculate [margin]

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- Pass/Fail test results is only used for the attribute results tests (such as External Condensation), which uses zero failure reliability and confidence into consideration for Sample Size calculation. For E.g. With 0.2 as Alpha (i.e., 80% Confidence) and 0.1 as Beta (i.e., 90% Reliability), the sample size tested for zero failures would be 16.

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 beta risk 0.1
 stdev (historical) 2.517
 margin (difference_to_detect) 2.134

Calculate Calculate

z-test
 minimum sample size for one-tailed test 7
 minimum sample size for two-tailed test NA

t-test
 minimum sample size for one-tailed t-test 8
 minimum sample size for two-tailed t-test NA

Pass/Fail test
 sample size for attribute data test 16

Historical Data
 54,49,51 [1,xx,x3...] Calculate 51,333 [mean] 2,517 [stdev]

Margin of Safety
 51,333 [mean] Calculate 2,134 [margin]
 54 [spec] [margin]
 [UL spec] [LL spec] Calculate [margin]

Last Update : Feb 24, 2023