The SilverSchmidt Reference Curve

Note

All reference curves described here were derived from tests on 150x150x150mm cubes. If you require a compressive strength estimate based on cylinder strength, then you should select the appropriate form factor.

Note

In existing structures it is recommended to check for carbonation and apply a correction factor to the result if necessary.

In all cases Proceq recommend to calibrate the hammer for the specific mix under test and to program a custom curve into the hammer for in-situ testing. This is not always possible, so two reference curves are provided for the N-hammer. When using these curves the following recommendations apply.

Use the lower 10th percentile curve:

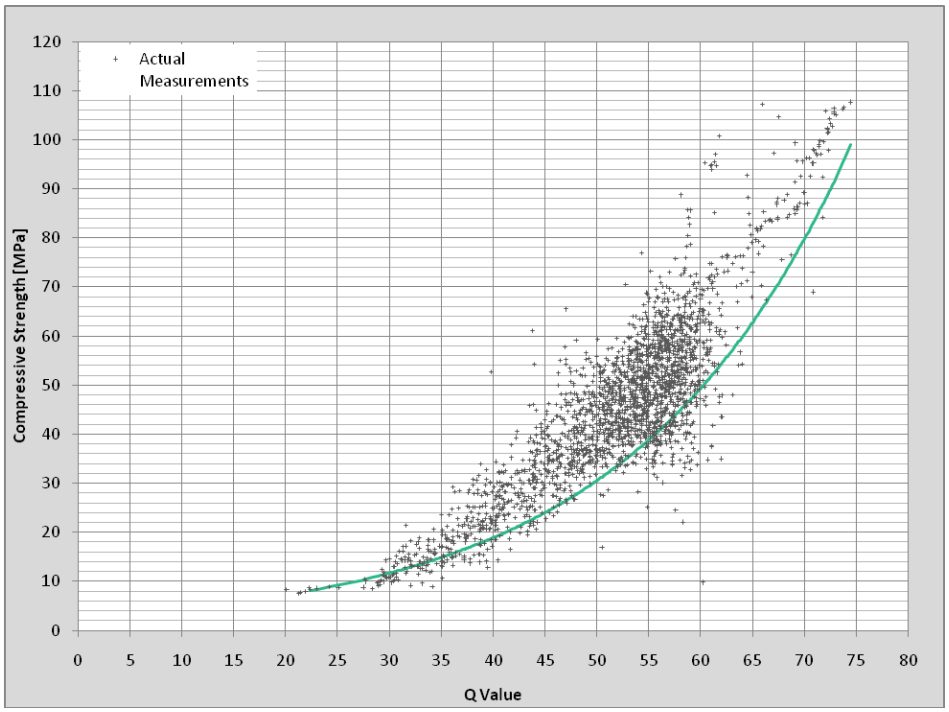
- If you do not know the details of the concrete mix under test.
- For existing buildings (concrete older than 28 days).
- You require a conservative estimate that can be shifted upwards by comparison with cores.

Lower 10th percentile curve

The default curve is the lower 10th percentile curve. This curve is derived from over 2'300 data points collected under controlled tests by the Federal Institute for Materials Research and Testing in Berlin, Germany, (BAM), the Shaanxi Province Construction Science Research Institute, China and Hunan University, China. It covers a large variety of concrete mixes.

A lower 10th percentile curve is recommended by the major standards EN 13791 and ASTM C805/ACI 228.1 to provide a safety margin to take into account the various factors that may affect the in-situ tests. 90% of the data pairs lie above the curve and 10% lie below. This curve is intended to give a conservative estimate in those cases that the hammer is not calibrated for the specific mix under test.

The formula of the lower 10th percentile curve is: $fck = 2.77e^{0.048Q}$. The valid range is from 22 Q up to 75 Q, which equals a compressive strength range of 8 MPa up to 100 MPa.



Use the reference N curve:

- if your mix design is similar to that provided in Appendix A and
- you are testing 28 day concrete

The reference N curve

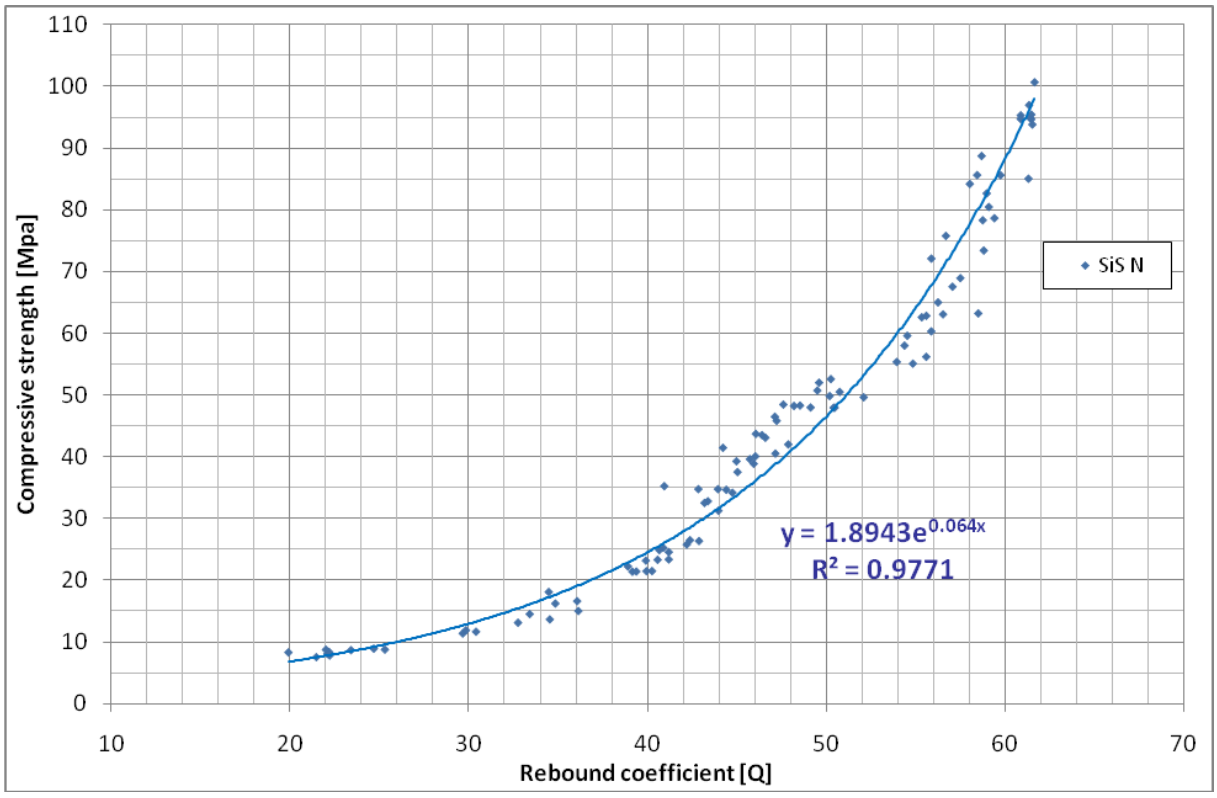
The REF N curve is based on the results of extensive tests carried out by Federal Institute for Materials Research and Testing in Berlin, Germany (BAM) on three mix designs that differentiated from each through the w/c ratio and the cement, to cover the compressive strength range of 10 N/mm2 – 100 N/mm2.

Concrete	Strength range	w/c ratio	Cement	Fuller grain size distribution curve
Concrete 1	10 – 30 N/mm2 1450 - 4351 psi	0.60	CEM I 32.5 R	AB 16
Concrete 2	30 - 55 N/mm2 4351 - 7977 psi	0.45	CEM I 42.5	AB 16
Concrete 3	55 – 100 N/mm2 7977 – 14504 psi	0.30	CEM I 52.5 R	AB 16

(Details of the mix design for each concrete mixture can be found in appendix A).

The low dispersion of this curve shows how a more exact correlation to compressive strength can be achieved if the hammer is calibrated specifically to a particular mix.

Conversion curve for SilverSchmidt ST/PC Type N (Valid range 20–62Q, 10-100 MPa)



The reference L curve

The reference L curve was derived at the same time and on the same concrete mixtures as the reference N curve. For the L-hammer a lower 10th percentile curve is not provided. When working on existing structures it is recommended to create a custom curve by calibrating with cores.

Conversion curve for SilverSchmidt ST/PC Type L (Valid range 20–62Q, 10-100 MPa)