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Profometer PM8000 Pro
Introduction to DBV guideline

Practical Method for Assessing Cover Readings

- The German Concrete and Construction Association **(Deutscher Beton- und Bautechnik-Verein, DBV)** have published a practical guideline for **assessing concrete cover on real structures.**
- The minimum concrete cover c_{min} is to be substantiated as:

  - 10%-quantile for elements according to DIN 1045-1, table 4 row 1 [R1] (XC1)

  - 5%-quantile for elements according to DIN 1045-1, table 4, rows 2-4 [R1]. (XC2-XC4)

Measurement Surfaces

- The following concrete structure surfaces are to be differentiated as measurement surfaces:

  - each side of a wall
  - the upper side of a ceiling
  - the under side of a ceiling
  - the sides of rectangular pillars
  - the vertical sides of a beam
  - the under side of a beam
  - the upper side of a beam

- Each measurement surface equates to a basic population.
- As a minimum 20 measurements are required for each surface.

Practical Method for Assessing Cover Readings

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DBV-Evaluation - Requirements

- The Neville-distribution is the basis for the statistical evaluation.
- It’s usability has been proven by carrying out parameter studies on finished structural elements.
- Each measurement surface (see previous slide) equates to a basic population.
- As a minimum 20 measurements are required for each surface.
- For the quantitative evaluation, after acquiring all of the measurement values, the first step is to determine the median $X_{M.}$
- Following this, in order to increase the validity, an upper boundary value X_{OG} is calculated from the median X_M and the smallest measured value X_{min} to be used for the evaluation of the measured values X_i.

- Measurement values that exceed this upper boundary value, are to be excluded and the quantitative analysis will be carried out with the reduced measurement series.

DBV-Evaluation - Procedure

1.	Arrange the data in order (n ≥ 20) and determine the median	$\overline{X_M} = X_{\left(\frac{n+1}{2}\right)}$ n is odd $\overline{X_M} = \frac{1}{2}\left[X_{\left(\frac{n}{2}\right)} + \left(X_{\left(\frac{n}{2}\right)+1}\right)\right]$ n is even
2.	Determine the mean	$\bar{X} = \frac{1}{n}\sum X_i$
3.	Standard deviation	$s = \sqrt{\frac{1}{n-1}\sum(X_i - \bar{X})^2}$ respectively $s = \sqrt{\frac{1}{n-1}\left(\sum X_i^2 - \frac{1}{n}(\sum X_i)^2\right)}$
4.	Location parameter (Centre value)	$r = \frac{\bar{X}+\overline{X_M}}{2}$
5.	Form parameter	$k = 1.8 \cdot \frac{r}{s}$
6.	Parameter ρ(x) with x = c_{min}	$\rho(x) = \frac{x}{r}$
7.	Distribution function with x = c_{min}	$F_x(x) = \frac{\rho(x)^k}{(1+\rho(x)^k)}$
8.	**Test decision** Target: 5% quantile for XC2-4, XD1-3, XS1-3 10% quantile for XC-1	Target / 5% quantile / 10% quantile Reject / $F(c_{min}) > 5\%$ / $F(c_{min}) > 10\%$ Accept / $F(c_{min}) \leq 5\%$ / $F(c_{min}) \leq 10\%$
9.	Alternative: Threshold value calculation of the concrete cover x = c(α%), that achieves a probability of α%.	$c(5\%) = \frac{r}{19^{\frac{1}{k}}}$ $c(10\%) = \frac{r}{9^{\frac{1}{k}}}$
10.	Alternative: **Test decision** Target: 5% quantile for XC2-4, XD1-3, XS1-3 10% quantile for XC-1	Target / 5% quantile / 10% quantile Reject / $c_{min} > c(5\%)$ / $c_{min} > c(10\%)$ Accept / $c_{min} \leq c(5\%)$ / $c_{min} \leq c(10\%)$

DBV statistics feature

- Relevant statistics without further processing
- for **efficient and informed decision-making**

Profometer App

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DBV (Deutscher Beton- und Bautechnik-Verein)
Advanced statistics to evaluate the risk of rebar corrosion. If percentiles fail then repair should be considered to extend the asset working & integrity life

Cumulative % chart
Visualize the distribution through the colored thresholds

TEST DECISION
Color code aligned with thresholds

Share
Share from anywhere the screenshot for reporting or decision-making with stakeholders

Thresholds sliders
Indicate immediately the adequate, low or too high cover values. Aligned with all other views.

Better decisions with advanced statistics