

Crack width and crack spacing in reinforced and prestressed concrete elements: database

Introduction

This README describes the database for crack width and spacing measurements in reinforced and prestressed concrete elements subjected to bending and axial forces.

Metadata:

- Title: crack width and crack spacing in reinforced and prestressed concrete elements: database
- Version: V7.0:
 - V7.0 contains some changes with respect to V6.0 (2025-08-19):
 - EPID01: error in the description of the width of 2-8T was fixed;
 - EPID02,03,04: load expressed in terms of moments instead of stresses;
 - EPID13,15,16: mean and maximum crack spacings were updated.
- Date: 2026-02-17 (year-month-day)
- Country: the Netherlands
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The database contains measurements from 31 experimental programs performed by various authors. These programs are described in the literature. In this **README**, the variables and input format of the variables are discussed. The experimental programs and other data can be found in the individual .xlsx files, each related to a single experimental program.

Each experimental program contains structural elements in which the crack widths and spacings were measured. Within each experiment, material specimens like cubes, cylinders or prisms were tested to determine the concrete compression strengths, tensile strengths and modulus of elasticity of the concrete, if applicable.

The master database, presented in the file "**00_Master_database.xlsx**", is queried in SQL and is available as a .xlsx file. The master database consists of a collection of 31 experimental programs. In contrast to the previous versions, where the widths and spacings were displayed in different rows, in the current version each of the widths and spacings are displayed in separate columns.

Structure of the database

The database consists of three levels:

- **Level 1** – *Experimental program* (identified with EPID): presents information about a publication and the described experimental program used to extract the data.
- **Level 2** – *Describes properties of structural elements* (identified with ELID) and material specimens:
 - *Geometry*: provides geometrical properties of the structural elements.
 - *Concrete*: describes the properties of the concrete using material specimens.
 - *Structural element preparation*: describe the curing, hardening conditions and the bond properties.
 - *Reinforcing steel*: describes the properties of the applied reinforcing steel (longitudinal and transverse direction) and the stirrups.
 - *Prestressing steel*: describes the properties of the applied prestressing steel in the longitudinal direction.
 - *Test setup*: describes how the load is applied on the structural elements and how and at which location the crack widths and spacings were measured.
- **Level 3** – *Loads and data points* (identified with LOADID):
 - *Loads*: qualifies and quantifies the applied loads on the structural elements.
 - *Data points*: describe the values of the measurements: the number of cracks, the crack widths and the crack spacings.

Assumptions of the database

- This database collected measured crack widths and spacings of 31 experimental programs published in the literature.
- It can be used to describe properties of structural elements with a vertical symmetry line.
- The database is valid for 4-point bending tests, axial tests or a combination of bending and axial forces.
- Structural elements with reinforcing and prestressing steel are considered.
- The variables are related to the constant bending moment region.
- If a cell is left empty or marked with a '0', the value is unknown or cannot be determined accurately in the experiments.

Example file

For completeness, an example file "**00_example_for_readme**" is included, discussing the used variables in each .xlsx file in detail.

- The orange input cells denote the value of a particular variable. In the example file, these are example values or text.
- The yellow cells contain the explanation of a particular variable.

Excluded structural elements

Not all structural elements were used. The table below shows which structural elements of a specific experimental program were excluded. The origin and sources are included in level 1 of the database and the bibliography of this README.

<i>epid</i>	<i>source</i>	<i>excluded structural elements</i>	<i>reason</i>
1	[1]	Series 1	A concrete pressure layer is present on top of the T-beams and has different properties concerning the pressure layer. This would overcomplicate the database.
2	[2]	R102, R103	Deep beams are outside the scope of the database.
3	[3]	T5, T6, T10, T14 15/207, 15/209	It does not appear in the scanned document. Unconventional reinforcing layout.
4	[4]	-	-
5	[5]	Structural elements loaded in bending	No detailed information is provided for the calculation procedure of the steel stress. This makes it difficult to trace the actual applied forces on the structural element.
6	[6]	-	-
7	[7]	Prestressed structural elements	The applied prestressing loads were not described in detail.
8	[8]	IVA	The beam was damaged before the test.
9	[9]	All except RB2404	Information on the geometry and prestressing loads is lacking, except for RB2404.
10	[10]	-	-
11	[11]	1B3a, 2B3a, 3B3a, 1C3a, 3C3a	The reinforcing steel is not located on the vertical symmetry line. This asymmetrical reinforcement configuration is outside the scope of the database.
12	[12]	1.8.2, 1.8.4, 1.8.5, 1.12.1, 1.12.3, 1.12.4, 1.18.1, 1.18.4, 1.24.1, 1.24.3, 1.24.4, 2.12.3, 2.12.4, 2.12.6, 2.18.1, 2.18.3, 2.18.4, 2.18.6, 3.18.1, 3.18.2, 3.18.5, Serie 4 and 5 of $\varnothing 12$, Serie 2 and 3 of $\varnothing 24$.	No detailed information about cracks is provided.
13	[13]	-	-
14	[14]	-	-
15	[15]	-	-
16	[16]	-	-
17	[17]	PD2, PP2D2, PP1D2, RD2, PD1, PD3, PP2D1, PP2D3, PP1D1, PP1D3, RD1, RD2	Elements tested for fatigue were removed.
18	[18, 19, 20, 21, 22]	B15, B16 C223, C233, C243	For B15 and B16, reinforcement as prestressing wires is present. Detailed information is missing. For C223, C233, and C243, a detailed description of the steel stresses is missing.
19	[23]	-	-
20	[24]	All, except of A-FP/f0-0, A-FPhs/f1-5, A-PP/f0-0, A-PPhs/f1-5	Steel fibres are applied inside the region of constant bending moment, or information about the prestressing loads is lacking. On the author's request of [24], a reference is made to [25].
21	[26, 27]	-	-
22	[28]	-	-
23	[29]	-	-
24	[30, 31, 32]	-	-
25	[33, 34]	S2-5nm, S1-5-2nm, S2-5-2nm	These are non-metallic reinforcement, which is outside the scope of this database.
26	[35]	-	-
27	[36, 37, 32]	-	-
28	[38]	-	-
29	[39, 40]	-	-
30	[41]	All except for S1UND, S2UND	The other elements contain corroded reinforcing bars.

31	[42, 43]	All except for T1-90-15, T2-90-30, T3-135-15, T4-135-30, T5-90-30	
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Acknowledgements

This database uses tabular data copied or generated from experimental programs whose results are published in the literature. The authors of those publications are fully acknowledged for their work.

Closure

This database is created with utmost care. In case of discrepancies between this database and the cited work, the cited work prevails. It is advised to read the original sources when using this database.

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