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Test methods for fibre-reinforced cementitious composites — Bending moment — Curvature curve by four-point bending test

Méthodes d'essai des composites à base de ciment renforcés par des fibres — Moment de flexion — Courbe de courbure par essai de flexion quatre points

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 71, *Concrete, reinforced concrete and pre-stressed concrete*, Subcommittee SC 6, *Non-traditional reinforcing materials for concrete structures*.

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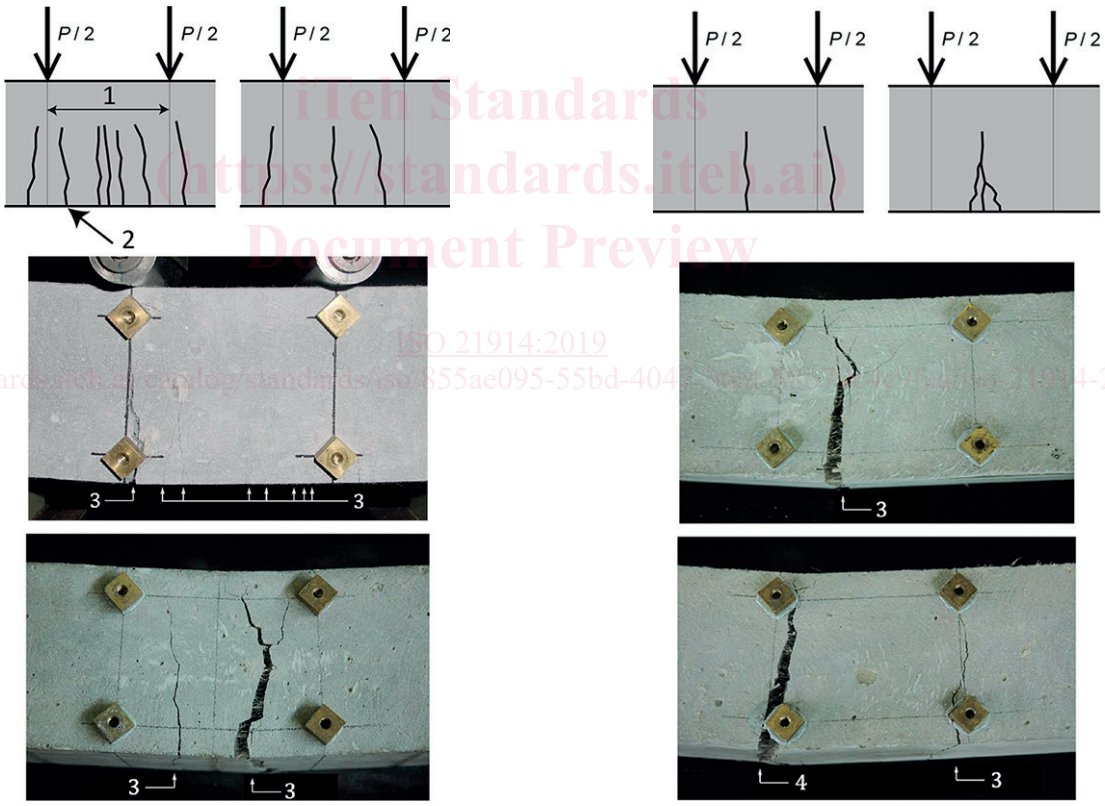
Test methods for fibre-reinforced cementitious composites — Bending moment — Curvature curve by four-point bending test

1 Scope

This document specifies the test method for obtaining bending moment-curvature curves of fibre-reinforced cementitious composites (FRCCs) through four-point bending test of prism specimens.

It is applicable to FRCCs that show separated multiple cracks under pure bending before maximum load.

NOTE Separated multiple cracks means two or more independent cracks visible to the eye occurring in the constant moment span from the bottom side over half depth of the specimen before maximum load is observed, as shown in Figure 1. For the purpose of confirmation of cracks, spraying up the specimen surface using an alcohol solution or acetone makes observations easier. The formation of multiple cracks is associated with deflection hardening behaviour. For FRCCs that do not show separated multiple cracks, see ISO 19044.



a) Applicable **b) Not applicable**

Key

1 constant moment span
2 crack visible to the eye
3 crack
4 crack (out of constant moment span)
P applied load

Figure 1 — Cracking in FRCCs covered by this document

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1920-3:—[1)], *Testing of concrete — Part 3: Making and curing test specimens*

ISO 1920-4:—[2)], *Testing of concrete — Part 4: Strength of hardened concrete*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
fibre-reinforced cementitious composite
FRCC
concrete or mortar containing short discrete fibres distributed throughout matrix

Note 1 to entry: Fibres include man-made fibres (e.g., metallic fibres, inorganic fibres, synthetic fibres) and natural fibres.

3.2
average strain
ratio of axial deformation to gauge length

3.3
average curvature
gradient of *average strains* (3.2) in constant moment span

4 Symbols

See Table 1.

Table 1 — Symbols

Symbol	Unit	Description	Subclause
b	mm	width of cross-section of specimen	5.1
D	mm	depth of cross-section of specimen	5.1
d_0	mm	distance between two LVDTs	6.4
L	mm	overall length of specimen	5.1
M	N·mm	bending moment	8
P	N	applied load	8
S	mm	specimen span	6.2
ε_1	—	average strain calculated by measured displacement of upper LVDT	8
ε_2	—	average strain calculated by measured displacement of lower LVDT	8

1) Under preparation. (Stage at the time of publication: ISO/DIS 1920-3:2018.)

2) Under preparation. (Stage at the time of publication: ISO/DIS 1920-4:2018.)