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Fibre-reinforced polymer (FRP) reinforcement of concrete — Test methods —

Part 3: CFRP strips

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Foreword

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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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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

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

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Fibre-reinforced polymer (FRP) reinforcement of concrete — Test methods —

Part 3: CFRP strips

1 Scope

This document specifies test methods applicable to unidirectional carbon fibre-reinforced polymer (CFRP) strips as external-bonded reinforcements on the concrete substrate.

This document is applicable for the CFRP strips that:

— consist of carbon fibre and thermoset resin;

— are manufactured by pultrusion method;

— have a higher carbon fibre fraction such as over 60 %; and

— have a thickness within 3 mm.

Also, the test pieces for determining tensile properties are cut down from CFRP strips along the CFRP strips axis, and have bonded anchorage block at the both ends.

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 7500-1, *Metallic materials — Calibration and verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Calibration and verification of the force-measuring system*

ISO 10406-2:2015, *Fibre-reinforced polymer (FRP) reinforcement of concrete — Test methods — Part 2: FRP sheets*

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
accelerated artificial exposure testing machine
machine that creates reproducible standard test conditions to accelerate weathering artificially

3.2
anchorage block
tab (3.6) corresponding to the test block to prevent bond failure of the CFRP strips

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3.3
anchorage portion
end parts of a test piece fitted with anchoring devices to transmit loads from the testing machine to the test portion

3.4
Young's modulus
E_f
elastic modulus in the direction of the fibres

3.5
strip
flat board which has thin thickness compared to width, a flatness-formed rectangular section and stretches in the longitudinal direction

3.6
tab
plate made of fibre-reinforced polymer, aluminium, or any other suitable material bonded to the test piece to transmit loads from the testing machine to the test portion

3.7
tensile capacity
F_u
maximum tensile load which the test piece bears during the tensile test

3.8
tensile strength retention rate
R_{ett}
ratio of the tensile strength after accelerated artificial exposure compared with tensile strength before accelerated artificial exposure

4 Symbols

For the purposes of this document, the symbols presented in Table 1 apply.

Table 1 — Symbols

Symbol	Unit	Description	Reference
A	mm^2	Cross-sectional area	5.4.3, 5.4.4
D_{tab}	°	Tab bevel angle	5.1.1
E_f	N/mm^2	Young's modulus	5.4.4
f_{fu}	N/mm^2	Tensile strength	5.4.3
f_{fu0}	N/mm^2	Average value for tensile strength before accelerated artificial exposure	6.4.3
f_{fu1}	N/mm^2	Average value for tensile strength after accelerated artificial exposure	6.4.3
F_u	N	Tensile capacity	5.4.3
L_{A1}	mm	Anchorage length	5.1.1
t_A	mm	Anchorage thickness	5.1.1
L_{A2}	mm	Anchorage portion length	5.1.1
b_{test}	mm	Width at the range of the test length	5.1.1
L_{test}	mm	Test length	5.1.1
t_{test}	mm	Thickness	5.1.1
L_{tot}	mm	Total length	5.1.1
R_{ett}	%	Tensile strength retention rate	6.4.3
ΔF	N	Difference between loads at 2 points at 20 % to 50 % tensile capacity	5.4.4

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