International Standard

ISO 18319-1

Fibre-reinforced polymer (FRP) reinforcement for concrete structures —

Part 1: Specifications of FRP sheets

Renforce en polymères renforcés avec fibres (PRF) pour structures en béton —

Partie 1: Spécifications des feuilles en PRF

Second edition
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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 document 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 concrete and pre-stressed concrete*, Subcommittee SC 6, *Non-traditional reinforcing materials for concrete structures*.

This second edition cancels and replaces the first edition (ISO 18319:2015) which has been technically revised.

The main changes are as follows:

— Characteristic value of tensile strength in Clause 5 was replaced by guaranteed value of tensile strength provided by the material supplier.

A list of all parts in the ISO 18319 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Fibre-reinforced polymer (FRP) sheets have been widely used for repairing and reinforcing existing concrete structures because of their lightweight and high tensile strength. On the other hand, the sheets are also brittle materials that break when they reach tensile strength. Their thickness is approximately 1 mm or less, which is extremely thin compared to the thickness of structural members. Therefore, FRP sheets are likely to cause stress concentration at convex or cracked areas on the concrete surface, so great care must be taken in design and construction.

Additionally, since FRP sheets have many different types and mechanical properties, suppliers need to clearly state their specifications so that users can appropriately and safely select their FRP sheets. This standard specifies tensile strength, elastic modulus, ultimate strain, length, width, and thickness as information provided by material suppliers to users and specifies evaluation methods. For tensile strength, the guaranteed value with 99,9 % reliability (subtracting three times the standard deviation from the mean strength) and the average value and standard deviation are specified because tensile strength of brittle FRP materials is significant factor to determine material fracture. The strength used in an appropriate design code according to ISO 14484 is based on the value provided by the material supplier.

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Fibre-reinforced polymer (FRP) reinforcement for concrete structures —

Part 1:
Specifications of FRP sheets

1 Scope

This document specifies requirements for fibre-reinforced polymer (FRP) sheets for upgrading of concrete members for material suppliers. The methodologies to express the mechanical properties as characteristic values, appearance and dimensions, and sampling test are specified in this document. The fibre orientation of the FRP sheets covered by this document is unidirectional.

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 291, *Plastics — Standard atmospheres for conditioning and testing*

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

ISO 5725, *Accuracy (trueness and precision) of measurement methods and results*

3 Terms and definitions

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

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

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

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

3.1
dry sheet
fibres in sheet form including sizing agent and weft, before application of the saturating resin matrix

3.2
sizing agent
any material applied to fibres to facilitate the handling and use of the fibres

Note 1 to entry: ‘Sizing agent’ is synonymous with ‘size' which is described in ISO 10548.

3.3
weft
thread to shape bundles in sheet form

4 Symbols

See Table 1.

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