



**International  
Standard**

**ISO 10406-4**

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

**Part 4:  
FRP grids**

**First edition  
2025-09**

**iTeh Standards  
(<https://standards.itih.ai>)  
Document Preview**

[ISO 10406-4:2025](https://standards.itih.ai/catalog/standards/iso/803fbc4-0ee2-4c79-a4a2-d5a0ce03d4d8/iso-10406-4-2025)

<https://standards.itih.ai/catalog/standards/iso/803fbc4-0ee2-4c79-a4a2-d5a0ce03d4d8/iso-10406-4-2025>

iTeh Standards  
(<https://standards.iteh.ai>)  
Document Preview

ISO 10406-4:2025

<https://standards.iteh.ai/catalog/standards/iso/803fbc4-0ee2-4c79-a4a2-d5a0ce03d4d8/iso-10406-4-2025>



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2025

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

Page

<b>Foreword</b>	<b>v</b>
<b>Introduction</b>	<b>vi</b>
<b>1 Scope</b>	<b>1</b>
<b>2 Normative references</b>	<b>1</b>
<b>3 Terms, definition, and symbols</b>	<b>2</b>
3.1 Terms and definition	2
3.2 Symbols	4
<b>4 General provision concerning test pieces</b>	<b>6</b>
<b>5 Test method for physical properties</b>	<b>6</b>
5.1 Cross-sectional area	6
5.1.1 Test piece	6
5.1.2 Test procedure	7
5.1.3 Calculation	7
5.1.4 Test report	7
5.2 Fibre volume fraction	8
5.2.1 Test pieces	8
5.2.2 Test procedure	8
5.2.3 Calculation	9
5.3 Coefficient of thermal expansion	10
5.3.1 Test pieces	10
5.3.2 Testing device	10
5.3.3 Test method	10
5.3.4 Calculations	11
5.3.5 Test report	11
<b>6 Test method for short-term mechanical properties</b>	<b>12</b>
6.1 Tensile property	12
6.1.1 Test pieces	12
6.1.2 Test equipment	12
6.1.3 Test procedure	13
6.1.4 Test temperature	13
6.1.5 Calculations	13
6.1.6 Test report	15
<b>7 Test method for durability</b>	<b>17</b>
7.1 Alkali resistance	17
7.1.1 Test pieces	17
7.1.2 Immersion in alkaline solution	17
7.1.3 External appearance and mass change	18
7.1.4 Tensile test	18
7.1.5 Calculations	18
7.1.6 Test report	19
<b>8 Test method for long-term mechanical properties</b>	<b>20</b>
8.1 Long-term relaxation	20
8.1.1 Test pieces	20
8.1.2 Testing frame and devices	20
8.1.3 Test temperature	21
8.1.4 Test method	21
8.1.5 Calculations	21
8.1.6 Test report	22
8.2 Tensile fatigue strength	22
8.2.1 Test pieces	22
8.2.2 Testing machine and devices	23
8.2.3 Test temperature	23

## ISO 10406-4:2025(en)

8.2.4	Test method .....	23
8.2.5	Calculations .....	24
8.2.6	Test report .....	24
8.3	Creep rupture strength .....	25
8.3.1	Test pieces .....	25
8.3.2	Testing frame and devices .....	25
8.3.3	Test temperature .....	25
8.3.4	Tensile capacity .....	25
8.3.5	Test method .....	25
8.3.6	Calculations .....	26
8.3.7	Test report .....	27
9	<b>Test methods for bond properties .....</b>	<b>28</b>
9.1	Bond property by pull-out testing .....	28
9.1.1	Test pieces .....	28
9.1.2	Testing machine and devices .....	29
9.1.3	Test method .....	29
9.1.4	Calculations .....	30
9.1.5	Test report .....	30
9.2	Bond property by single-lap shear test .....	32
9.2.1	Test pieces .....	32
9.2.2	Testing machine and devices .....	33
9.2.3	Test method .....	33
9.2.4	Calculations .....	34
9.2.5	Test report .....	35
10	<b>Informative references .....</b>	<b>36</b>

**ITeh Standards**  
**(<https://standards.iteh.ai>)**  
**Document Preview**

[ISO 10406-4:2025](https://standards.iteh.ai/catalog/standards/iso/803fbc4-0ee2-4c79-a4a2-d5a0ce03d4d8/iso-10406-4-2025)

<https://standards.iteh.ai/catalog/standards/iso/803fbc4-0ee2-4c79-a4a2-d5a0ce03d4d8/iso-10406-4-2025>

## 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](http://www.iso.org/directives)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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](http://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 first edition cancels and replaces the second edition (ISO 10406-1:2015) which has been technically revised.

The main changes are as follows:

- inclusion of thermoplastic resin for FRP grids;
- fibre volume fraction testing and single-lap shear bond test methods have been added;
- tensile performance, alkali resistance, and pull-off bond test methods are modified;
- test method for performance of anchorages and couplers, test method for transverse shear strength, and test method for flexural tensile properties have been deleted.

A list of all parts in the ISO 10406 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](http://www.iso.org/members.html).

## Introduction

Fibre Reinforced Polymer (FRP) grids, renowned for their high strength, lightweight nature, excellent bond behaviour, and superior durability, serve a pivotal role in rehabilitating existing RC structures and reinforcing new constructions. Incorporating FRP grids effectively within structures, it becomes imperative to comprehensively understand involves a comprehensive understanding of their physical properties, mechanical characteristics, long-term performance, durability, and bond capabilities. This understanding is crucial to ensures that structures reinforced or constructed with FRP grids meet the stringent design requirements.

However, the prevalent testing methods for FRP bars or sheets, as outlined in existing specifications, are insufficient in adequately accounting for the spatial bidirectional characteristics inherent in FRP grids. Therefore, the need arises to develop an internationally recognized standard that specifically delineates testing methodologies tailored for FRP grids. This document aims to establish a framework for testing procedures that consider the distinctive spatial bidirectional properties of these grids. Additionally, the document provides essential material properties data required for structural design, offering engineers and designers a reliable basis for incorporating FRP grids into their projects. By formulating a document for testing FRP grids, we endeavor to fill the existing gap in methodologies and facilitate a more accurate assessment of their performance. This document not only enhances the reliability of structural designs utilizing FRP grids but also promotes their wider and more efficient use in construction projects worldwide.

iTeh Standards  
(<https://standards.iteh.ai>)  
Document Preview

[ISO 10406-4:2025](https://standards.iteh.ai/catalog/standards/iso/803fbc4-0ee2-4c79-a4a2-d5a0ce03d4d8/iso-10406-4-2025)

<https://standards.iteh.ai/catalog/standards/iso/803fbc4-0ee2-4c79-a4a2-d5a0ce03d4d8/iso-10406-4-2025>