ISO 10406-2:2025-11 (E)

Fibre-reinforced polymer (FRP) reinforcement of concrete - Test methods - Part 2: FRP sheets

Contents

Page

Foreword ..... **vi**

1 Scope **1**

2 Normative references **1**

3 Terms and definitions **1**
3.1 Definitions 1
3.2 Symbols 3

4 General provision concerning test pieces **4**

5 Test method for determining tensile properties **4**
5.1 Test pieces 4
5.1.1 Types and dimensions 4
5.1.2 Preparation 5
5.1.3 Curing of test pieces 7
5.1.4 Anchorage portion of test pieces 7
5.1.5 Conditioning of test pieces 7
5.1.6 Number of test pieces 8
5.2 Testing machine and measuring devices 8
5.2.1 Testing machine 8
5.2.2 Strain gauges/extensometers 8
5.3 Test method 8
5.3.1 Dimensions of test pieces 8
5.3.2 Mounting of strain gauges/extensometers 8
5.3.3 Mounting of test piece 8
5.3.4 Loading rate 8
5.3.5 Test temperature 8
5.3.6 Range of test 8
5.4 Calculation and expression of test results 9
5.4.1 General 9
5.4.2 Load-strain curve 9
5.4.3 Tensile strength 9
5.4.4 Young's modulus 10
5.4.5 Ultimate strain 10
5.5 Test report 10

6 Test method for overlap splice strength **11**
6.1 Test pieces 11
6.1.1 Dimensions 11
6.1.2 Preparation 11
6.1.3 Curing of test pieces 12
6.1.4 Anchorage portion of test pieces 12
6.1.5 Conditioning of test pieces 12
6.1.6 Number of test pieces 12
6.2 Testing machine 13
6.3 Test method 13
6.3.1 Dimensions of test pieces 13
6.3.2 Mounting the test piece 13
6.3.3 Loading rate 13
6.3.4 Range of test 13
6.4 Calculation and expression of test results 13
6.4.1 General 13
6.4.2 Failure categories 13

6.4.3 Overlap-splice strength 14
6.5 Test report 14

7 Test method for determining bond properties of FRP sheets to concrete 15
7.1 Test pieces 15
7.1.1 Types and dimensions 15
7.1.2 Quality of concrete 17
7.1.3 Steel bars 17
7.1.4 Preparation of test pieces 17
7.1.5 Conditioning of test pieces 18
7.1.6 Number of test pieces 19
7.2 Testing machine and measuring devices 19
7.2.1 Testing machine 19
7.2.2 Chucks 19
7.3 Test method 19
7.3.1 Dimensions of the test pieces 19
7.3.2 Mounting of test pieces 19
7.3.3 Loading rate 19
7.3.4 Test temperature 19
7.3.5 Range of test 19
7.4 Calculation and expression of test results 19
7.4.1 General 19
7.4.2 Failure categories 19
7.4.3 Interfacial fracture energy 20
7.4.4 Bond strength 20
7.5 Test report 20

8 Test method for direct pull-off strength of FRP sheets with concrete 21
8.1 Test pieces 21
8.1.1 Dimensions 21
8.1.2 Preparation 21
8.1.3 Mounting of steel devices and notching 21
8.1.4 Conditioning of test pieces 22
8.1.5 Number of test pieces 22
8.2 Testing machine and measuring devices 22
8.3 Test method 23
8.3.1 Setting up the testing machine 23
8.3.2 Loading rate 23
8.3.3 Test temperature 23
8.3.4 Scope of test 23
8.4 Calculation and expression of test results 23
8.4.1 Handling of data 23
8.4.2 Bond strength 23
8.4.3 Failure categories 23
8.5 Test report 24

9 Test method for freeze/thaw resistance 24
9.1 Test pieces 24
9.1.1 Types and dimensions 24
9.1.2 Number of test pieces 24
9.2 Testing machine and measuring devices 24
9.2.1 Freeze/thaw testing machine 24
9.2.2 Tensile testing machine 25
9.3 Test method 25
9.3.1 Freezing and thawing method 25
9.3.2 Control of freezing and thawing temperatures 25
9.3.3 Tensile strength test and overlap splice strength test 25
9.4 Calculation and expression of test results 25
9.4.1 Tensile strength retention 25
9.4.2 Overlap splice strength retention 26
9.5 Test report 26

10 Test method for exposure to laboratory light sources 27
10.1 Test pieces 27
10.1.1 Accelerated artificial exposure plate 27

10.1.2 Number of accelerated artificial exposure plates 27
10.1.3 Types and dimensions 27
10.1.4 Number of test pieces 27
10.2 Testing machine and measuring devices 27
10.3 Test method 28
10.3.1 Test period 28
10.3.2 Tensile strength test and overlap splice strength test 28
10.4 Calculation and expression of test results 28
10.4.1 Visual inspection 28
10.4.2 Handling of data 28
10.4.3 Tensile strength retention 28
10.4.4 Overlap-splice strength retention 29
10.5 Test report 29

11 Test method for durability 30
11.1 Types of test methods for durability 30
11.2 Test piece 30
11.2.1 Durability test for pull-off strength — Test A 30
11.2.2 Durability test for bond properties — Test B 30
11.2.3 Durability test for overlap splice strength — Test C 30
11.3 Test method 31
11.3.1 Durability test for pull-off strength — Test A 31
11.3.2 Durability test for bond properties — Test B: dry-and-wet-cycle test 32
11.3.3 Durability test for overlap splice strength — Test C: dry-and-wet-cycle test 32
11.4 Calculation and expression of test results 32
11.4.1 Durability test for pull-off strength — Test A 32
11.4.2 Durability test for bond properties — Test B 32
11.4.3 Durability test for overlap splice strength — Test C 32
11.5 Test report 32
11.5.1 Durability test for pull-off strength — Test A 32
11.5.2 Durability test for bond properties — Test B 32
11.5.3 Durability test for overlap splice strength — Test C 33