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Fibre-cement flat sheets

AMENDMENT 1

Plaques planes en fibres-ciment

AMENDEMENT 1

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

Amendment 1 to ISO 8336:1993 was prepared by Technical Committee ISO/TC 77, *Products in fibre reinforced cement*.

Fibre-cement flat sheets

AMENDMENT 1

Page 1, subclause 4.1

Replace the text by:

4.1 Type A

Type A sheets are intented for external applications where they may be subjected to the direct action of sun, rain and/or snow. They may be supplied coated or uncoated. Type A sheets shall comply with the requirements of the type-tests in clause 6.

The sheets are further classified into three categories according to their modulus of rupture based on bending strength.

The manufacturer shall declare the type and the category of his product in his literature.

Page 2, subclause 4.2

Replace the text by:

4.2 Type B

Type B sheets are not subjected to the type-tests and are intented for internal and external applications where they will not be subjected to the direct action of sun, rain and/or snow.

The sheets are further classified into five categories according to their modulus of rupture based on bending strength.

The manufacturer shall declare the type and the category of his product in his literature.

Page 2, subclause 5.1.3 b)

Replace the text by:

b) on thickness, e: ± 10 %

For sheets without texture on the exposed face the maximum difference between extreme values of the thickness measurements within one sheet shall not exceed 15 % of the maximum measured value.

The measurement method is given in 8.1.1.3.

Pages 2 and 3, subclause 5.2.1 and NOTE 5

Replace the text by:

5.2.1 Bending strength

When tested as specified in 8.1.2.1, the minimum modulus of rupture of the sheets, expressed in megapascals, shall be as specified in Table 1. The modulus of rupture shall be the average of the values obtained from testing the samples in both directions.

This determination of mechanical properties shall be carried on preconditioned specimens in ambient or wet conditions or as specified by national standards. In the absence of national standards, type testing shall be carried out for type A only on wet preconditioned specimens.

Type B sheet strengths shall only be specified in the ambient condition and the specimens shall be tested in this ambient condition.

NOTE 5 If the manufacturer includes product strengths in his literature, it should be clearly stated whether they are mean or minimum values and they should be determined using the methods specified in 8.1.2.1. The minimum values are based on the same sampling and inspection procedures as for classification in Table 1.

Table 1 — Minimum modulus of rupture

Values in megapascals

Category	Minimum MOR	
	Type A sheets (Wet)	Type B sheets (Ambient)
1	–	4
2	4	7
3	7	10
4	13	16
5	18	22

Page 3, subclause 6.3

Replace the text by:

6.3. Frost resistance [5] (optional test)

The total number of freeze-thaw cycles shall be defined by the national standards specifying the test with a minimum of 25 cycles. In the absence of national standards, 25 cycles shall be carried out.

Sheets are tested as specified in 8.2.3. After completion of the specified cycles a visual inspection and, if required, a bending strength test are carried out in accordance with 8.2.3.

Interpretation of the results shall be described in the national standards.

5) These requirements do not apply to surface coatings.

Page 3

Add a new subclause, 6.7

6.7 Reaction to fire

For the purpose of conformity with national reglementations, products may be subjected to specific reaction to fire tests. The details of the specifications and acceptance criteria shall be defined by national standards and/or regulations.

Page 4, subclause 7.2

Replace the text by:

7.2 Type-tests

A type-test is concerned with the approval of a new product and/or a fundamental change in formulation and/or method of manufacture, the effects of which cannot be predicted on the basis of former experience.

The test shall be performed on the as-delivered product.

The test is required to demonstrate conformity of a generic product to a specification but is not required for each production batch.

When type-tests are carried out, the product shall also be subjected to the acceptance tests to ensure that it complies with the requirements of this International Standard.

These type-tests are:

a) bending strength (compulsory), see 6.1.

b) water permeability (compulsory), see 6.2.

c) frost resistance (optional), see 6.3.

d) warm water (optional), see 6.4.

e) soak-dry (optional), see 6.6.

Page 4, subclause 8.1.1.1

Replace the text by:

8.1.1.1. Apparatus

a) Smooth, flat, rigid inspection surface of production quality and of dimensions appropriate to the dimensions of the sheets.

Two metal rules shall be fixed at right angles along adjacent edges of the inspection surface. The straightness of each metal rule shall be at least 0,3 mm/m and the right angle shall be accurate to at least 0,1 % (less than 1 mm deviation from normal per metre of length) or 0,001 rad. The arms shall be at least the length of the sheet edges.

b) Suitable metal rulers, capable of being read to 0,5 mm.

c) Dial gauge, reading at least to 0,05 mm, with flat parallel metal jaws, between 6 mm and 15 mm in diameter.

Page 5, subclause 8.1.1.4

Replace the text by:

8.1.1.4 Measurement of straightness of edges

Measurement of straightness of edges may be carried out according one of the two following alternative methods:

a) Apply each of the edges to the relevant arm of the square. Measure, to the nearest 0,5 mm by means of a steel rule, the greatest separation between the edge of the sheet and the arm of the square. Report the results.

b) Assess each result against the tolerance given in 5.1.4.1

c) Measure, to the nearest 0,5 mm by means of a steel rule, the greatest separation between the edge of the sheet and a string or wire stretched from one corner of the sheet to the adjacent one. Report the results.

   Assess each result against the tolerance given in 5.1.4.1

Page 6, subclause 8.1.2.1.3

Replace the text by:

8.1.2.1.3 Conditioning for ambient strength

Store the test specimens in the laboratory at a minimum temperature of 5 °C, for a minimum of 3 d if the nominal thickness of the sheets is $\leqslant$ 20 mm, and for a minimum of 7 days if the nominal thickness is $>$ 20mm.

Specimens have to be placed in such a manner that all the faces are adequately ventilated.

Information on temperature and relative humidity at the beginning of the conditioning shall be indicated in the report.

Page 8, subclause 8.2.1.1

Replace the text by:

8.2.1.1 General

This test method is designed to assess the ambient modulus of rupture and the wet modulus of rupture.

Page 9, subclause 8.2.1.4

Replace the text by:

8.2.1.4 Expression and interpretation of results

The ambient modulus of rupture shall be the arithmetic mean of the test results obtained in the ambient conditions. The wet modulus of rupture shall be the arithmetic mean of the test results obtained in the wet condition.

Assess the results against the specifications of 6.1.

Page 9, subclause 8.2.2.4

Replace the text by:

8.2.2.4 Procedure

Place and seal the frame on top of the face of the specimen and fill with water to a height of 20 mm above the face of the sheet. Place the specimen at ambient temperature (above 5 °C). The duration of the test shall be 24 h.

Page 9, subclause 8.2.3.3

Replace the text by:

8.2.3.3 Procedure

Submit one lot of 10 specimens to the bending test in accordance with 8.2.1 and at the same time submit the other lot of 10 specimens to the following freeze-thaw test.

At the same time immerse the specimens in water at ambient temperature (above 5 °C) until the difference of mass between two consecutive weighings spaced 24 h apart is less than 0,5 %.

Submit the specimens to the required number of cycles consisting of:

— cooling in air to − 20 °C ± 2 °C in not less than 1 h and not more than 2 h. The specimens shall be held at − 20 °C ± 2 °C for 1 h (see notes in 8.2.3.4);

— thawing in water to reach + 20 °C ± 2 °C within 1 h and 2 h maximum. The specimens shall be maintained in water at 20 °C ± 2 °C for 1 h and then freezing shall recommence (see notes in 8.2.3.4).

Each freeze-thaw cycle shall have a minimum cycle time of 4 h and a maximum of 6 h.

The temperature specified above refers to the freezing cavity.

At the end of this period, place the specimens in a laboratory atmosphere for 7 d.

Examine the specimens with the naked eye in order to detect possible cracks, delamination or other defects, and record any observation.

After preliminary conditioning, carry out the bend test as specified in 8.1.2.1.

Page 11, subclause 10.1

Replace the text by:

10.1 Conformity with requirements

The manufacturer shall establish and maintain an effective documented quality control system developed, e.g., on the basis of the standards of the series ISO 9000.

The AQL shall be determined in accordance with national standards. For acceptance tests, 90 % in the statistical meaning of the delivered products shall fulfil the requirements of 5.1. and 5.2. In absence of national documents, the sampling schemes provided in ISO 390 with an AQL of 4 %[6)] and an inspection level

6) A sampling scheme with an AQL of 4 % means that the batches containing up to 4 % defective items have a high probability of acceptance.

S_3 ensure that, for large batches, approximately 90 % of the items fulfil these requirements. Other methods may be used provided they give the same level of quality.

For each type-test, in the absence of a fundamental change to the formulation and/or method of manufacture, results from one test performed shall be taken as conformity to the specification.

Page 11, subclause 10.2

Replace the text by:

10.2 Evidence of conformity of consignment of finished products

When tenders and/or orders specify receiving inspection, the lots delivered are presumed to be in conformity with the standard.

Inspection of a consignment of finished products should take place only where there is no third-party certification. It is conducted, e.g., in accordance with ISO 390, which gives an AQL of 4 % with an inspection level S_3, and in accordance with annex A. For special applications, different levels of quality may be applied after agreement between manufacturer and purchaser.

Page 12, Annex A

Annex A is replaced by the following text.

Annex A
(normative)

Receiving inspection for products which are not subject to third-party certification

See National standards or, by default, ISO 390.

A.1 When tenders and/or orders specify it, the receiving inspection is carried out in lots of the consignment according to the test programme of this product standard, unless there is a special agreement. Therefore, the test programme necessarily covers the acceptance tests.

Details related to the application of the sampling clauses shall be established in agreement between the manufacturer and the purchaser.

A.2 After agreement on the sampling procedure, sampling shall be carried out, in the presence of both parties, from lots which are to be delivered to the purchaser. If the inspection lots are not yet formed, the manufacturer should present to the purchaser, the stock(s) from which the inspection lot(s) can be selected and marked. Failing such an agreement, the maximum and minimum inspection lots shall be 8 000 and 4 000 sheets respectively for all dimensions.

A.3 The tests shall normally be carried out by an independent laboratory selected by mutual agreement between the manufacturer and the purchaser. The laboratory of the manufacturer can be used. In case of dispute, the tests shall be carried out in the presence of both parties.

A.4 When non-destructive tests are carried out and the results of the sampling inspection do not meet the acceptance requirements of the product standard, the tests may be required on each item of the consignment. The units of the consignment which do not meet the requirements when tested one by one can be refused and disposed of, unless otherwise agreed upon between manufacturer and purchaser.

Page 13, Annex B

Annex B is replaced by the following text.

Annex B
(informative)

Systems tests

B.1 General

This annex describes an optional test method to assess the performance of a cladding system composed of fibre-cement sheets in a particular installation (sub-frame and fixings) under cyclic changes of heat and moisture. This test should be carried out on finished products.

B.2 Principle

Sheets are fixed to a building frame in accordance with the recommended installation practices of the manufacturer. The system is then subjected to alternate wetting and heating cycles, following which any structural alteration is recorded.

B.3 Sampling

Sheets used for the test shall be drawn at random from the stock of finished products. The number of sheets required will depend upon the manufacturer's installation recommendations and on the sheet size under test.

B.4 Apparatus

Test installations with the following facilities:

— a sub-frame to which the sheets under test may be fixed vertically.

— water spray system which will provide complete wetting on one face.

— Heating system to provide uniform radiant heat to give a black body[7] temperature across the complete test frame surface of 60 °C ± 5 °C[7] and approximately uniform power output during the cycle.

B.5 Test procedure

Select a representative installation system.

Assemble the system in accordance with the manufacturer's recommendations. The construction should include provision for at least one sheet joint in its central region. The perimeter of the frame should allow standard sheet edge finishing. The frame dimensions shall give a minimum area of 3,5 m^2 and allow at least two sheets to be installed with normal orientation.

The pitch shall be 90° for façades. For other applications the pitch may be varied as appropriate.

If the area of each sheet is 1,8 m^2 or more, use two specimens. If the combined area of the sheets exceeds 5 m^2, the sheet length may be reduced to provide a test area of not more than 5 m^2.

If the area of each sheet is less than 1,8 m^2, use a sufficient number of sheets to cover an area between 3 m^2 and 5 m^2.

Fix the sample sheets to the test frame observing all the manufacturer's recommendations. The edge fixing distance should be the minimum allowed and the centre distance between fixings should be the maximum allowed. Include all weather-proofing and other attachments normally specified in the assembly. Where sheets are recommended to have overlapping joints, assemble the test frame accordingly.

7) For the definition of a blackbody see ASTM E 638-78. For this test, an aluminium plate of 1 mm thickness painted with a matt black paint is used as a blackbody.

The measurement device is a thermocouple or a similar device fixed to the surface of the aluminium plate.