

INTERNATIONAL
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**Certification scheme for welded fabric for
the reinforcement of concrete structures**

*Système particulier de certification des treillis soudés pour le
renforcement des constructions en béton*



Reference number
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Foreword

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International Standard ISO 11082 was prepared by Technical Committee ISO/TC 17, *Steel*, Sub-Committee SC 16, *Steels for the reinforcement and prestressing of concrete*.

Annex A of this International Standard is for information only.

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Certification scheme for welded fabric for the reinforcement of concrete structures

1 Scope

This International Standard specifies rules for a certification scheme for continuous production of welded fabric for ordinary reinforcement of concrete structures, in order to verify the conformity with requirements specified in product standards such as ISO 6935-3.

A certification scheme for continuous production consists of the following stages:

- suitability testing (see clause 4);
- internal inspection by the manufacturer (see clause 5);
- inspection and supervision by an external body (see clause 6).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 6935-3:—¹⁾, *Steel for the reinforcement of concrete — Part 3: Welded fabric.*

ISO 9002:1987, *Quality systems — Model for quality assurance in production and installation.*

1) To be published.

ISO/IEC Guide 39:1988, *General requirements for the acceptance of inspection bodies.*

ISO/IEC Guide 40:1983, *General requirements for the acceptance of certification bodies.*

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 certification scheme: Certification system as related to specified products, processes or services to which the same particular standards and rules, and the same procedure, apply. [ISO/IEC Guide 2]

3.2 certification body: Body that conducts certification of conformity. [ISO/IEC Guide 2]

3.3 characteristic value: Value having a prescribed probability of not being attained in a hypothetical unlimited test series. [ISO 8930]

NOTE 1 Equivalent to *fractile*, which is defined in ISO 3534.

3.4 fabric type: Fabric with wires and wire arrangements of one kind, however with variable length and width.

3.5 inspection: Activities such as measuring, examining, testing, gauging one or more characteristics of a product or service and comparing these with specified requirements to determine conformity. [ISO 8402]

3.6 inspection body (for certification): Body that performs inspection services on behalf of a certification body. [ISO/IEC Guide 2]

4 Suitability testing

4.1 Purpose

The purpose of the suitability testing is to ensure that the manufacturer has the capability and resources to produce welded fabric in accordance with the requirements specified in the product standards.

4.2 Organization

The certification body shall comply with the requirements of ISO/IEC Guide 40.

4.3 Procedure

Suitability testing consists of the following stages:

- inspection of conditions for production (4.3.1);
- sampling and testing of specimens (4.3.2);
- verification of the long-term quality level (4.3.3).

If satisfactory results are not achieved in one stage, all the stages shall be repeated. Suitability testing applies separately for each type of fabric and each method of welding. If a fabric type is manufactured by various welding processes, suitability testing shall be carried out to its full extent for each of these processes.

4.3.1 Inspection of the production conditions

Inspection of the production conditions shall include the following:

- the competence of the personnel and satisfactory organization of the work;
- the adequacy of the equipment for production;
- the independence of the department responsible for quality assurance from the production department;
- the suitability of the test equipment for internal testing;
- the ability of the manufacturer's quality system to ensure the quality of the products. A quality system according to ISO 9002 is considered satisfactory.

The inspection report shall include an evaluation of the activities from receipt of wire to dispatch of fabric.

NOTE 2 The wire should be subject to a separate certification scheme, according to ISO 10144.

4.3.2 Sampling and testing of specimens

4.3.2.1 General

The test samples shall be taken from the production of the plant concerned. The test shall cover the entire range of diameters, grades and spacings for which certification is applied.

4.3.2.2 Extent of sampling and testing

Three different fabric types shall be tested. For each selected type, at least 30 test pieces shall be taken at random from at least 5 tons of a lot, to determine each mechanical and geometrical property specified in the product standard. The samples shall be taken at random from the lot presented for testing by a representative from the inspection body. Care should be taken to ensure that the specimens taken generally reflect the properties of the fabric.

4.3.2.3 Properties to be tested

All properties specified in the product standard shall be tested and compared with its requirements.

4.3.2.4 Evaluation of the test results

The results (individual values, average values, standard deviations) of the tests shall be collated in a test report.

4.3.2.5 Approval

Once the test results have been evaluated positively by the certification body, a works symbol and an approval to produce for a specific period are granted to the manufacturer. During this period the long-term quality level shall be verified.

4.3.3 Verification of the long-term quality level

4.3.3.1 Extent of testing

In order to verify the long term quality level, the manufacturer shall perform an increased number of tests (internal and external inspection) for a sufficiently long period (between 6 months and 1 year). The manufacturer shall double the extent of testing specified in 5.2.1.1 for the internal inspection. During this period, external inspection shall be carried out more intensively than specified in 6.3.

4.3.3.2 Evaluation

At the end of the period specified in 4.3.3.1, all results of internal and external inspection shall be evaluated separately and compared with each other. The long-term quality level determined by appropriate statistical methods shall correspond to the requirements of 5.2.2.2, if a characteristic value is specified in the product standard.

4.3.3.3 Approval

Once the test results have been evaluated positively by the certification body, a licence is issued to the manufacturer.

5 Internal inspection by the manufacturer

5.1 Purpose

Continuous internal inspection of production by the manufacturer is intended to ensure that the level of quality remains satisfactory with time and that, in the case of test results which do not conform to the conditions, necessary measures can be taken to improve production.

5.2 Procedure

Internal inspection by the manufacturer consists of

- testing of all partial quantities of continuous production (see 5.2.1);
- determination of the long-term quality level (see 5.2.2).

5.2.1 Testing the partial quantities

5.2.1.1 Extent of testing

The acceptance unit when testing partial quantities for each fabric type shall not exceed 25 tons. For each of the characteristics specified in the product standard, at least one test piece shall be taken from the test unit.

5.2.1.2 Evaluation of the test results

When a characteristic value is specified, the following requirement for the individual values (x_i) of the test unit shall be met:

$$x_i > 0,95 f_k$$

where f_k is the specified characteristic value according to the product standard.

All other requirements shall be met by each individual test piece.

Where test results are unsatisfactory according to this sub-clause, the manufacturer shall immediately take the necessary precautions. Test units which do not conform to the requirements shall be set aside.

5.2.2 Determination of the long-term quality level

The long-term quality level shall be evaluated separately for each fabric type.

5.2.2.1 Extent of testing

The results of tests on all partial quantities of the continuous production in accordance with 5.2.1 shall be collated and statistically evaluated and submitted to the inspection body and/or the certification body after at least 200 results have been presented, and at least every 3 months, in order to determine the long-term quality level.

5.2.2.2 Evaluation where characteristic values are specified

The average value (m) shall satisfy the following requirement:

$$m \geq f_k + k \times s_n$$

where s_n is the standard deviation of the n results according to 5.2.2.1.

The values for the acceptability index (k) are listed in table 1, for a failure rate of 5 % ($p = 0,95$) at a probability of 90 % ($1 - \alpha = 0,90$).

Table 1 — Acceptability index (k) as a function of the number (n) of the test results

n	k	n	k
5	3,40	30	2,08
6	3,09	40	2,01
7	2,89	50	1,97
8	2,75	60	1,93
9	2,65	70	1,90
10	2,57	80	1,89
11	2,50	90	1,87
12	2,45	100	1,86
13	2,40	150	1,82
14	2,36	200	1,79
15	2,33	250	1,78
16	2,30	300	1,77
17	2,27	400	1,75
18	2,25	500	1,74
19	2,23	1 000	1,71
20	2,21	∞	1,64

6 Inspection by an external body

6.1 Purpose

The purpose of external inspection is:

- continuous inspection of the conditions of production for compliance with the conditions established in the suitability test (see 4 3.1);
- continuous supervision of the proper procedure of internal inspection as specified in clause 5.

6.2 Organization

The certification body may authorize an inspection body to carry out the external inspection and supervision. The inspection body shall satisfy the requirements of ISO/IEC Guide 39.

6.3 Procedure

6.3.1 External inspection and supervision by the organization specified in 6.2 shall be carried out at maximum intervals of 6 months.

All properties subjected to internal inspection shall be tested. The specimens shall be taken from the manufacturer's or consumer's stock. The test results shall be statistically evaluated and compared with the results from internal inspection. The number of tests in external inspection shall be sufficient to allow an assured assessment.

The results of external and internal inspection shall also be assessed for systematic errors in sampling, test procedures and evaluation. To this end, parallel tests on test pieces from at least 10 sheets from the same fabric type shall be carried out in each case by the manufacturer and the body undertaking external inspection, and the results of these tests shall be compared.

6.3.2 The long-term quality level shall be determined at least twice a year and this shall be compared with the results achieved in internal inspection (see 5.2.2).

6.4 Evaluation

The results of external inspection shall be recorded in a supervision report which shall be sent to the certification body. If the results show that the production does not conform to the requirements, appropriate measures shall be taken, depending on the type and significance of the deficiencies noted, for example:

- warning the manufacturer;
- intensification of inspection (increase the frequency of testing);
- requesting that the conditions of production should be changed;
- withdrawal of approval.

7 Delivery document

7.1 Welded fabric which has been produced in compliance with the requirements of a relevant product standard and subjected to quality assurance as described in clauses 4 to 6 of this International Standard, shall be supplied with a delivery document which contains the following information:

- a) name of the manufacturing works;
- b) symbol or number of works;
- c) body carrying out external supervision;
- d) fabric type;
- e) designation according to the product standard;
- f) quantity supplied;
- g) date of manufacture;
- h) recipient.

7.2 Where welded fabric is supplied via a dealer or bending works, the dealer or bending works shall confirm on the delivery document that the fabric only originates from manufacturing works which carry out quality supervision according to the requirements of this International Standard.

Annex A
(informative)

Bibliography

- [1] ISO 3534:1977, *Statistics — Vocabulary and symbols.*
- [2] ISO 8402:1986, *Quality — Vocabulary.*
- [3] ISO 8930:1987, *General principles on reliability for structures — List of equivalent terms.*
- [4] ISO 10144:1991, *Certification scheme for steel bars and wires for the reinforcement of concrete structures.*
- [5] ISO/IEC Guide 2:1991, *General terms and their definitions concerning standardization and related activities.*

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Descriptors: concrete, reinforced concrete, reinforcing steels, steel products, welded wire lattice, certification.

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