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Steel for the reinforcement and prestressing of concrete — Test methods —

Part 2: Welded fabric

Aciers pour l'armature et la précontrainte du béton — Méthodes d'essai —
Partie 2: Treillis soudés

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 part of ISO 15630 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 15630-2 was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 16, *Steels for the reinforcement and prestressing of concrete*.

This part of ISO 15630, together with parts 1 and 3, cancels and replaces ISO 10065:1990, ISO 10287:1992 and ISO 10606:1995.

ISO 15630 consists of the following parts, under the general title *Steel for the reinforcement and prestressing of concrete — Test methods*:

— *Part 1: Reinforcing bars, wire rod and wire*

— *Part 2: Welded fabric*

— *Part 3: Prestressing steel*

Introduction

The aim of ISO 15630 is to provide all relevant test methods for reinforcing and prestressing steels in one standard. In that context, the existing International Standards for testing these products have been revised and updated. Some further test methods have been added.

Reference is made to International Standards on testing of metals in general as they are applicable. Complementary provisions have been given if needed.

Test methods which do not form the subject of an existing International Standard on metal testing are fully described in ISO 15630.

Steel for the reinforcement and prestressing of concrete — Test methods —

Part 2: **Welded fabric**

1 Scope

This part of ISO 15630 specifies test methods applicable to welded fabric.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 15630. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 15630 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 4965:1979, *Axial load fatigue testing machines — Dynamic force calibration — Strain gauge technique*

ISO 6892:1998, *Metallic materials — Tensile testing at ambient temperature*

ISO 7438:1985, *Metallic materials — Bend test*

ISO 7500-1:1999, *Metallic materials — Verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Verification and calibration of the force-measuring system*

ISO 9513:1999, *Metallic materials — Calibration of extensometers used in uniaxial testing*

ISO/TR 9769:1991, *Steel and iron — Review of available methods of analysis*

3 Symbols

See Table 1.

Table 1 — Symbols

Symbol	Unit	Description	Reference
A	%	Percentage elongation after fracture	5.1, 5.3
A_g	%	Percentage non-proportional elongation at maximum force (F_m)	5.3
A_{gt}	%	Percentage total elongation at maximum force (F_m)	5
A_n	mm^2	Nominal cross-sectional area of the bar or wire	8.4.2
d	mm	Nominal diameter of the bar or wire	5.3, 7.2, 8.4.8
D	mm	Diameter of the mandrel of the bending device in the bend test on welded intersection	6.2.1 (Figure 2), 6.3
f	Hz	Frequency of load cycles in the fatigue test	8.1, 8.4.3
F_m	N	Maximum force in the tensile test	5.3
F_r	N	Force range in the axial load fatigue test	8.1, 8.3, 8.4.2, 8.4.3
F_s	N	Weld shear force	Clause 7
F_{up}	N	Upper force in the axial load fatigue test	8.1, 8.3, 8.4.2, 8.4.3
r_1	mm	Distance between the grips and the gauge length for the manual measurement of A_{gt}	5.3
r_2	mm	Distance between the fracture and the gauge length for the manual measurement of A_{gt}	5.3
R_{eH}	N/mm^2	Upper yield strength	5.2, 5.3
R_m	N/mm^2	Tensile strength	5.3
$R_{p0,2}$	N/mm^2	0,2 % proof strength, non-proportional extension	5.2, 5.3
γ	°	Angle of bend in the bend test on welded intersection	6.3
$2\sigma_a$	N/mm^2	Stress range in the axial load fatigue test	8.4.2
σ_{max}	N/mm^2	Maximum stress in the axial load fatigue test	8.4.2

NOTE 1 N/mm^2 = 1 MPa.

4 General provisions concerning test pieces

The test pieces shall be taken from the welded fabric in the as-delivered condition.

For the determination of the mechanical properties in the tensile test and the fatigue test, the test piece may be artificially aged depending on the requirements of the relevant product standard.

NOTE When the product standard does not specify any ageing treatment, the following conditions may be applied: heating the test piece to 100 °C, maintaining at this temperature ± 10 °C for a period of 1 hour $^{+15}_{0}$ min and then free cooling in still air to the ambient temperature.

When an ageing treatment is applied to the test pieces, the conditions of the ageing treatment shall be stated in the test report.

The test piece shall include at least one welded intersection. The number of welded intersections in the test piece shall be noted in the test report.

Cross wires or bars and the wire or bar not to be tested in a twin wire or bar sample shall be cut off before the test without damaging the wire or bar to be tested or the weld under test.

5 Tensile test

5.1 Test piece

In addition to the general provisions given in clause 4, the free length of the test piece shall be sufficient for the determination of percentage elongations in accordance with 5.3.

When percentage elongation after fracture (A) is determined, the test piece shall be marked according to clause 8 of ISO 6892:1998.

When percentage total elongation at maximum force (A_{gt}) is determined by the manual method, equidistant marks shall be made on the free length of the test piece (see annex H of ISO 6892:1998). The distance between the marks shall be 20 mm, 10 mm or 5 mm, depending on the bar or wire diameter.

5.2 Test equipment

The testing machine shall be verified and calibrated in accordance with ISO 7500-1 and shall be at least of class 1.

When an extensometer is used it shall be of class 1 (see ISO 9513) for the determination of R_{eH} or $R_{p0,2}$; for the determination of A_{gt}, a class 2 extensometer (see ISO 9513) may be used.

5.3 Test procedure

The tensile test shall be carried out in accordance with ISO 6892. For the determination of $R_{p0,2}$, if the straight portion of the force-extension diagram is limited or not clearly defined, one of the following methods shall be applied:

— the procedure recommended in 13.1 of ISO 6892:1998;

— the straight portion of the force-extension diagram shall be considered as the line joining the points corresponding to 0,1 F_m and 0,3 F_m.

In case of dispute, the second procedure shall be applied.

NOTE The test should be considered invalid when the slope of this line differs by more than 10 % from the theoretical value of the modulus of elasticity.

For the calculation of tensile properties (R_{eH} or $R_{p0,2}$, R_m), the nominal cross-sectional area shall be used, unless otherwise specified in the relevant product standard.

Where fracture occurs in the grips or at a distance from the grips of less than 20 mm or d (whichever is the greater), the test may be considered as invalid.

For the determination of percentage elongation after fracture (A), the original gauge length shall be 5 times the nominal diameter (d), unless otherwise specified in the relevant product standard.