SLOVENSKI STANDARD
SIST EN ISO 11782-2:2008

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SIST ISO 11782-2:1999

Korozija kovin in zlitin - Ugotavljanje pokanja zaradi korozijske utrujenosti - 2. del: Preskus za ugotavljanje napredovanja razpok z vzorci z umetno razpoko (ISO 11782-2:1998)

Corrosion of metals and alloys - Corrosion fatigue testing - Part 2: Crack propagation testing using precracked specimens (ISO 11782-2:1998)

Korrosion von Metallen und Legierungen - Prüfung der Schwingungskorrosion - Teil 2: Rissausbreitungsprüfung an angerissenen Proben (ISO 11782-2:1998)

Corrosion des métaux et alliages - Essais de fatiguecorrosion - Partie 2: Essais d'amorce de rupture sur des éprouvettes préfissurées (ISO 11782-2:1998)

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Corrosion of metals and alloys - Corrosion fatigue testing - Part 2: Crack propagation testing using precracked specimens (ISO 11782-2:1998)

Corrosion des métaux et alliages - Essais de fatigue-corrosion - Partie 2: Essais d'amorce de rupture sur des éprouvettes préfissurées (ISO 11782-2:1998)

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

The text of ISO 11782-2:1998 has been prepared by Technical Committee ISO/TC 156 “Corrosion of metals and alloys” of the International Organization for Standardization (ISO) and has been taken over as EN ISO 11782-2:2008 by Technical Committee CEN/TC 262 “Metallic and other inorganic coatings” the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2008, and conflicting national standards shall be withdrawn at the latest by October 2008.

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The text of ISO 11782-2:1998 has been approved by CEN as a EN ISO 11782-2:2008 without any modification.

INTERNATIONAL STANDARD

ISO 11782-2

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Corrosion of metals and alloys — Corrosion fatigue testing —

Part 2:
Crack propagation testing using precracked specimens

Corrosion des métaux et alliages — Essais de fatigue-corrosion —
Partie 2: Essais d'amorce de rupture sur des éprouvettes préfissurées

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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.

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.

International Standard ISO 11782-2 was prepared by Technical Committee ISO/TC 158, *Corrosion of metals and alloys*.

ISO 11782 consists of the following parts, under the general title *Corrosion of metals and alloys — Corrosion fatigue testing*:

— *Part 1: Cycles to failure testing*

— *Part 2: Crack-propagation testing using precracked specimens*

Annex A of this part of ISO 11782 is for information only.

Introduction

Crack propagation testing employs precracked specimens to provide information on the threshold conditions and on rates of corrosion fatigue crack growth. These data can be used in the design and evaluation of engineering structures where corrosion fatigue crack growth can dominate component life.

Because of the need to maintain elastically constrained conditions at the crack tip, the precracked specimens used for crack propagation tests are not suitable for the evaluation of thin products such as sheet or wire and are generally used for thicker products including plate, bar and forgings. They can also be used for parts joined by welding.

The results of corrosion fatigue testing are suitable for direct application only when the service conditions exactly parallel the test conditions especially with regard to material, environmental and stressing considerations.

Corrosion of metals and alloys — Corrosion fatigue testing —

Part 2:
Crack propagation testing using precracked specimens

1 Scope

1.1 This part of ISO 11782 describes the fracture mechanics method of determining the crack growth rates of pre-existing cracks under cyclic loading in a controlled environment and the measurement of the threshold stress intensity factor range for crack growth below which the rate of crack advance falls below some defined limit agreed between parties.

1.2 This part of ISO 11782 provides guidance and instruction on corrosion fatigue testing of metals and alloys in aqueous or gaseous environments.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO 11782. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this part of ISO 11782 are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 7539-1:1987, *Corrosion of metals and alloys — Stress corrosion testing — Part 1: General guidance on testing procedures.*

3 Definitions

For the purposes of this part of ISO 11782, the following definitions apply.

3.1 corrosion fatigue: Process involving conjoint corrosion and alternating straining of the metal, often leading to cracking.

NOTE — Corrosion fatigue may occur when a metal is subjected to cyclic straining in a corrosive environment.

3.2 force, P**:** Force applied to the specimen considered positive when its direction is such as to cause the crack faces to move apart.

3.3 maximum force, P_{max}**:** Algebraic maximum value of force during a loading cycle.

3.4 minimum force, P_{min}**:** Algebraic minimum value of force during a loading cycle.

3.5 force range, ΔP**:** Difference between the algebraic maximum and minimum values of the force.

3.6 stress intensity factor, K_I: Function of applied load, crack length and specimen geometry having dimensions of stress (length)$^{1/2}$ which uniquely defines the elastic stress field intensification at the tip of a crack subjected to opening mode displacements (mode I).

NOTE — It has been found that stress intensity factors, calculated assuming that specimens respond purely elastically, correlate the behaviour of real cracked bodies provided that the size of the zone of plasticity at the crack tip is small compared to the crack length and the length of the uncracked ligament. In this standard, mode I is assumed and the subscript I is implied everywhere.

3.7 maximum stress intensity factor, K_{max}, in fatigue: Highest algebraic value of the stress intensity factor in a cycle corresponding to the maximum load.

3.8 minimum stress intensity factor, K_{min}, in fatigue: Lowest algebraic value of the stress intensity factor in a cycle.

NOTE — This value corresponds to the minimum load when the stress ratio, R, is greater than zero and is set equal to zero when R is less than or equal to zero.

3.9 range of stress intensity factor, ΔK, in fatigue: Algebraic difference between the maximum and minimum stress intensity factors in a cycle:

$$\Delta K = K_{max} - K_{min}$$

3.10 threshold stress intensity factor range, ΔK_{th}, in fatigue: Value of the stress intensity factor range below which the rate of crack advance becomes insignificant for the application.

3.11 stress ratio, R, in fatigue loading: Algebraic ratio of the minimum and maximum force in a cycle

$$R = \frac{P_{min}}{P_{max}} = \frac{K_{min}}{K_{max}}$$

3.12 cycle: Smallest segment of the load- or stress-time function which is repeated periodically. The terms fatigue cycle, load cycle and stress cycle are also commonly used.

3.13 fatigue crack growth rate, da/dN: Rate of crack extension caused by fatigue loading and expressed in terms of crack extension per cycle.

3.14 stress intensity factor coefficient, Y: Factor derived from the stress analysis for a particular specimen geometry which relates the stress intensity factor for a given crack length to the load and specimen dimensions.

3.15 plane strain fracture toughness, K_{Ic}: The critical value of K at which the first significant environmentally independent extension of the crack occurs under the influence of rising stress intensity under conditions of high constraint to plastic deformation.

3.16 specimen orientation: The fracture plane of the specimen identified in terms of firstly the direction of stressing and secondly the direction of crack growth expressed with respect to three reference axes. These are identified by the letters X, Y and Z.

where

Z is coincident with the main working force employed during manufacture of the material (short-transverse axis);