

**Structural adhesives - Test methods for
assessing long term durability of bonded
metallic structures**

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long term durability of bonded metallic structures

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 15190:2007 sisaldab Euroopa standardi EN 15190:2007 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 30.10.2007 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 15190:2007 consists of the English text of the European standard EN 15190:2007.</p> <p>This document is endorsed on 30.10.2007 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p>Käsitlusala: This standard specifies test procedures for determining the long-term durability of an adhesive system subjected to environmental and fatigue loads. The procedures are based upon measurement of the crack growth rate and the resistance to crack propagation through the adhesive layer in double cantilever beam type specimens under an applied mode I opening cycling loading.</p>	<p>Scope: This standard specifies test procedures for determining the long-term durability of an adhesive system subjected to environmental and fatigue loads. The procedures are based upon measurement of the crack growth rate and the resistance to crack propagation through the adhesive layer in double cantilever beam type specimens under an applied mode I opening cycling loading.</p>
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English Version

Structural adhesives - Test methods for assessing long term durability of bonded metallic structures

Adhésifs structuraux - Méthodes d'essai pour évaluer la durabilité à long terme des structures métalliques collées

Strukturklebstoffe - Prüfverfahren zur Bewertung der Langzeitbeständigkeit geklebter metallischer Strukturen

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Foreword

This document (EN 15190:2007) has been prepared by Technical Committee CEN/TC 193 “Adhesives”, the secretariat of which is held by AENOR.

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 February 2008, and conflicting national standards shall be withdrawn at the latest by February 2008.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Safety statement

Persons using this document should be familiar with the normal laboratory practice, if applicable. This document does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any regulatory conditions

Introduction

Susceptibility to fatigue crack growth under hot humid conditions is one of the major concerns for the durability assessment of bonded metallic joints. Knowledge of the long-term durability of bonded joints is useful for product development and material selection. Furthermore, it has been shown that the relationship between cyclic mode I strain energy release rate and crack growth rate is independent of geometry and load application. This allows the materials characterisation data measured from RDCB testing to be applied directly to other joined metallic structures, and therefore the data are useful for establishing design allowable criteria used in their life assessment.

1 Scope

1.1 This standard specifies test procedures for determining the long-term durability of an adhesive system subjected to environmental and fatigue loads. The procedures are based upon measurement of the crack growth rate and the resistance to crack propagation through the adhesive layer in double cantilever beam type specimens under an applied mode I opening cycling loading.

1.2 The test specimens consist of rectangular metal substrates bonded together with a pre-starter crack in the bondline. For testing joints consisting of relatively thin sheets of metallic substrates the specimen needs to be structurally reinforced by adding layers of compatible material to the back of each adherend substrate in order to prevent permanent deformation, usually referred to as reinforced double cantilever beam (RDCB) test specimen.

1.3 For brevity, the standard relates to testing RDCB specimens, which are essentially more complex in manufacturing than standard double cantilever beam (DCB) specimens. However, the standard allows also for use of single substrate double cantilever beam specimens when the substrate material is available in sufficient thickness.

1.4 The test method has been proven to be particularly sensitive in finding weaknesses within certain adhesive systems and is recommended as a scientific tool to study adhesion properties. This test method may be used to determine:

- The fatigue crack growth rate as a function of the mode I strain energy release rate;
- The threshold values for negligible crack growth;
- The effects of other environmental factors (temperature and/or humidity cycling);
- The mode I (peel or crack opening) failure mode of the adhesive joint (cohesive, interfacial, near-surface ...).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 923:2005, *Adhesives – Terms and definitions*

EN 13887, *Structural Adhesives - Guidelines for surface preparation of metals and plastics prior to adhesive bonding*

EN ISO 9142, *Adhesives - Guide to the selection of standard laboratory ageing conditions for testing bonded joints (ISO 9142:2003)*

ISO 15024, *Fibre-reinforced plastic composites — Determination of mode I interlaminar fracture toughness, G_{Ic} , for unidirectionally reinforced materials*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 923:2005 and the following apply.