International Standard

ISO 25218

First edition
2026-11

Composites and reinforcements fibres — Carbon fibre reinforced plastics (CFRPs) and metal assemblies — Test method for cross-tension fatigue properties

Composites et fibres de renfort — Assemblages de plastiques renforcés de fibres de carbone (CFRP) et de métal — Méthode d'essai pour les propriétés de fatigue en traction transversale

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Reference number
ISO 25218:2026(en)

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Published in Switzerland

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Foreword

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This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 13, *Composites and reinforcement fibres*.

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Introduction

This document specifies a method for determining the cross-tensional fatigue properties of the bonded plates of carbon fibre reinforced plastics (CFRPs) to metal assemblies, with a standard specimen loaded in cross-tension and under specified conditions of preparation, conditioning and testing. This method is intended for testing only those bonded plates used in bonding carbon fibre reinforced plastics (CFRPs) to metal assemblies.

The potential benefits to the users of CFRP-metal assemblies of assessing the cross-tensional fatigue properties of the bonded plates of carbon fibre reinforced plastics (CFRPs) to metal assemblies based on this document are:

a) expanding CFRP applications to the fields of the combinations with metallic components;

b) the detection or the prevention of physical properties loss - such as ion migration and time-related degradation in sealant film, injected calking layer and glass fibre reinforced plastics (GFRPs) layer;

c) demonstrating the conformity to specified conditions for type certification requirements in the engineering such as aircraft developments;

d) evaluating the procedures for maintenance, repair and overhaul (MRO) in the engineering operation of CFRP aircraft.

It is not the intent of this document to imply the need for:

— omitting relevant field tests for CFRP related engineering;

— generally specifying the dimensions of test specimen to represent CFRPs related bonded or fastened structures;

— superimposing test results for specific applications of the parameters that exceed the range of this document.

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IMPORTANT — Persons using this document should be familiar with 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.

SAFETY STATEMENT — It is recognized that some of the materials permitted in this document might have a negative environmental impact. As technological advances lead to more acceptable alternatives for such materials, they will be eliminated to the greatest extent possible. At the end of the test, care should be taken to dispose of all waste in an appropriate manner.

1 Scope

This document specifies test specimens and procedures for fatigue testing at ambient conditions, under repeated tensile loading, generating cross-tension loading to the bonded plates of carbon fibre reinforced plastics (CFRPs) to metal assemblies.

This document applies to bonded plates used in bonding CFRPs to metal assemblies with adhesive or other specified methods.

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2 Normative references

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The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

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

ISO 9513, *Metallic materials — Calibration of extensometer systems used in uniaxial testing*

ISO 10365, *Adhesives — Designation of main failure patterns*

ISO 24360, *Composites and reinforcements fibres — Carbon fibre reinforced plastics (CFRPs) and metal assemblies — Determination of the cross tension strength*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 10365 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
cross tension fatigue test
fatigue test that applies a repeated tensile load to the cross-tension test specimen mounted between the jaws of the fatigue-testing machine

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