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Composites and reinforcement fibres — Carbon fibre reinforced plastics (CFRPs) and metal assemblies — Combined stress test

Composites et fibres de renfort — Assemblages de plastiques renforcés de fibres de carbone (CFRP) et de métal — Essais sous contraintes combinées

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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*.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

This document provides a test method for producing a well-controlled combined stress state in plane-stress conditions. This methodology can provide an accurate means for evaluating the strength of bonded metal-composite assemblies that depends only on the interaction between dissimilar adherend, the adhesive, and the interfaces subjected to various combined loadings. The results can be used to create the failure envelope for metal-composite assemblies for use in the design optimization of metal-composite assemblies. The original fixture was designed to study the shear properties of polymers[1] and later modified to perform combined load tests for various materials, including bonded assemblies of dissimilar materials.[2],[3]

This document is intended to provide experimental apparatus, test procedures, and manipulation of the result for determining the strength of adhesive-bonded metal-CFRP-metal assemblies under combined loading conditions.

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Composites and reinforcement fibres — Carbon fibre reinforced plastics (CFRPs) and metal assemblies — Combined stress test

1 Scope

This document specifies the test method used to determine the strength of the adhesive-bonded carbon fibre reinforced plastics (CFRP) to metal assemblies under combined loading conditions. The loading fixture, a standard specimen, and procedure for combined shear and normal load tests under plane stress conditions are provided. The test method is also applicable to bonded joints between metals and other composite materials, including glass fibre-reinforced plastics.

This document does not cover specimen preparation of the adhesive joint.

2 Normative references

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 291, *Plastics — Standard atmospheres for conditioning and testing*

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 10365, *Adhesives — Designation of main failure patterns*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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
applied load
F
force applied in the loading axis that causes simultaneous shear and normal stresses on the bonded area

Note 1 to entry: See Figure 1.

3.2
maximum applied load
F_{max}
highest value of force observed in the applied load-displacement curve

Note 1 to entry: See Figure 4.

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