
Adhesives — Designation of main failure patterns

Adhésifs — Désignation des principaux faciès de rupture

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 11, *Products*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 193, *Adhesives*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 10365:1992), which has been technically revised.

The main changes compared to the previous edition are as follows:

- failure with stress whitening of adhesive (SWCF) has been added;
- debonding due to bondline corrosion (COR) has been added;

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Adhesives — Designation of main failure patterns

1 Scope

This document specifies the designations for the main types of failure pattern of bonded assemblies and illustrates, through diagrams, their respective appearances.

This document applies to all mechanical tests performed on a bonded assembly, regardless of the nature of the adherends and adhesive which make up the assembly.

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 472, *Plastics — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 472 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

assembly

<for adhesives> group of materials or parts, including adhesive, which have been placed together for bonding or which have been bonded together

3.2

adhesion failure

adhesive failure

rupture of an adhesive bond in which the separation appears visually to be at the adhesive/adherend interface

3.3

cohesion failure

cohesive failure

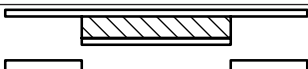
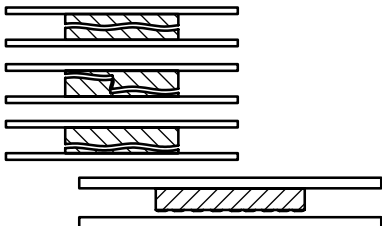
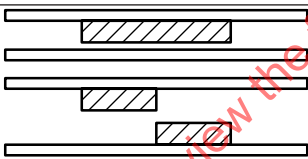
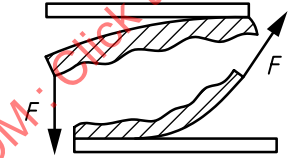
rupture of a bonded assembly in which the separation appears visually to be in the adhesive or the adherend

4 Application

The designation of the failure patterns is provided to classify failures in order to understand better the result of any mechanical test of adhesion on a bonded assembly, which is usually expressed by quantitative measured values.

The failure patterns are designated in accordance with the illustrations in [Table 1](#).

Table 1 — Designation of failure patterns

	Failure patterns	Designation
Adherend	 Failure of one or both adherends (Substrate failure)	SF
	 Failure of an adherend (Cohesive substrate failure)	CSF
	 Failure through lamination (Delamination failure)	DF
Adhesive	Type of cohesion failure  Cohesion failure Special cohesion failure Failure with stress whitening of adhesive	CF SCF SWCF
	 Adhesion failure	AF
	 Adhesion and cohesion failure with peel	ACFP
	 Debonding due to bondline corrosion	COR

If more than one type of failure occurs, an approximate percentage for each type of failure pattern shall be given after each designation (see [Figure 1](#)).

If a delamination failure occurs (i.e. the coating tears off the adherend), the designation (DF) shall be followed by the nature of the coating.

NOTE 1 Types of coating include primer, varnish, paint, phosphatization, etc.

When an oscillating failure of two patterns occurs, it is indicated by adding “OSC” after the description of the failure patterns:

AF(50 %)+CF(50 %),OSC

NOTE 2 The slip-stick mode of oscillating failure is typical of a system constituted by an elastic adherend and an adhesive which can undergo a transition between different failure mechanisms (cohesion and adhesion failure or ductile and brittle-cohesion failure), elastic energy being periodically stored and released by the adherend.

[Figure 2](#) illustrates a typical pattern of oscillating cohesion and adhesion failure.