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**Adhesives — Designation of main  
failure patterns**

*Adhésifs — Désignation des principaux faciès de rupture*

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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.

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](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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](http://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;

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](http://www.iso.org/members.html).

# 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**

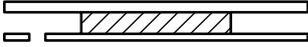
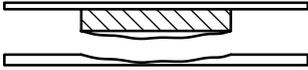
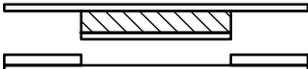
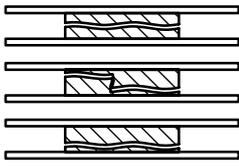
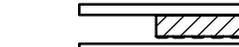
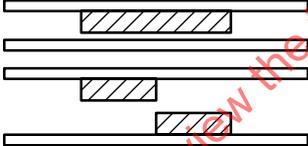
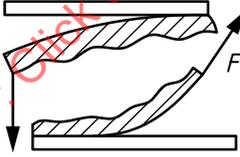
rupture of a bonded assembly in which the separation appears visually to be in the adhesive or the adherend

## 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 CF
		Special cohesion failure SCF
	 Failure with stress whitening of adhesive	SWCF
		Adhesion failure AF
	 Adhesion and cohesion failure with peel	ACFP
Corrosion at inter- face	 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.