
**Imaging materials — Photographic
films and papers — Wedge test for
brittleness**

*Matériaux pour l'image — Films et papiers photographiques —
Détermination de la méthode dite <<du coin>>*

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 18907 was prepared by Technical Committee ISO/TC 42, *Photography*.

This second edition cancels and replaces the first edition (ISO 18907:2000), of which it constitutes a minor revision with the following changes:

- Clause 2 has been updated;
- Annex A has been removed.

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Introduction

In the case of photographic films and papers, brittleness is an undesirable property since satisfactory performance in equipment or in handling requires sufficient flexibility (or lack of brittleness) to ensure good tolerances to bending stresses under the atmospheric conditions likely to be encountered in practice.

Photographic films and papers are laminates of two or more different materials, usually a plastic or paper support and firmly bonded gelatin layers that contain image forming and other substances. These laminate structures must have sufficient flexibility to withstand the stresses imposed by bending and flexing during use. However, under low relative humidity and low temperature conditions, the gelatin layers and/or support tend to become brittle. This can cause the formation of cracks and/or breaks when the laminate is stressed beyond its diminished capacity to withstand bending and flexing.

Different types of brittle failure occur when film and paper are subjected to stress in different ways. For example, failure can consist of very fine cracks in the emulsion (without a break in the support) which are objectionable when the photograph is viewed. Under different conditions or with different materials, failure can consist of cracks in the support or a complete break of all components of the laminate.

Brittleness is not an absolute physical property. The apparent brittleness of photographic material is very dependent upon the manner in which it is mechanically treated as well as the ambient conditions of temperature and relative humidity. As a result, no one test for brittleness is capable of ranking a variety of types of photographic material as they would behave under widely different practical conditions.

The wedge test for brittleness specified in this International Standard subjects the photographic material to a high rate of strain in a simple folding action. It has been an accepted method of rating brittleness for many years and has correlated with product behaviour under many practical applications. It is a widely accepted method in the photographic industry. Other methods used have consisted of flex tests in which the specimen is subjected to a repeated folding action until it breaks, or the bending over mandrels of different diameters. There are a considerable number of flexibility tests available and standardization is not possible at this time.

Brittleness is affected adversely by both reduced temperature and reduced relative humidity. Brittleness at low relative humidity is encountered more frequently than brittleness at low temperature in most applications. Moreover, a marked change in brittleness can occur with only a very small change in relative humidity below a level of about 25 %. Consequently, brittleness tests are carried out only in an atmosphere which is very accurately controlled with respect to both temperature and relative humidity.

Brittleness is also very dependent on the sample thickness, increasing with increasing thickness of either support or emulsion. For this reason, the thickness of the layers must be considered when comparing the behaviour of different materials. The thermal and moisture exposure history of the material between manufacture and testing can also affect the brittleness even though the sample is reconditioned to a standard temperature and humidity.

Gelatin is generally more brittle than the support, so that photographic products having a gelatin layer on only one side are usually more brittle when bent with the gelatin side out (that is, gelatin under tension).

Brittleness can vary with the bend axis depending upon the orientation of the support. There is generally no directional effect in the brittleness of the emulsion.