INTERNATIONAL STANDARD

ISO 10331

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Photography — Unprocessed photographic films and papers — Storage practices

Photographie — Films photographiques et papiers de tirage non traités — Pratiques de stockage

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Contents

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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.

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.

International Standard ISO 10331 was prepared by Technical Committee ISO/TC 42, *Photography*.

Introduction

ISO International Standards have been written specifying the recommended practices for the storage of processed films (ISO 5466) and processed paper prints (ISO 6051). This International Standard is concerned with the storage of unprocessed photographic materials. While many of the recommendations for unprocessed and processed storage are similar, there are some important differences. These include the beneficial effects of low temperature and the harmful effects of adverse storage and radiation.

Photography — Unprocessed photographic films and papers — Storage practices

1 Scope

This International Standard gives guidance on the storage of radiation sensitive films and papers from the time of manufacturing to the time of processing. It applies to photographic materials that are either unexposed (raw) or exposed. It does not apply to processed films and paper prints.

This International Standard is applicable to black-and-white and colour photographic materials: negative films, positive films, reversal films, positive papers and X-ray films.

This International Standard is applicable to safety films as defined in ISO 543.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 543:1990, *Photography — Photographic films — Specifications for safety film.*

3 Definition

For the purposes of this International Standard, the following definition applies.

3.1 raw photographic material: Photographic material that has not been exposed to actinic radiation and has not been photographically processed.

4 Storage conditions

4.1 General

The photographic properties of radiation sensitive films and papers change during ageing. These changes are affected by high temperatures and high relative humidities and may also be influenced by plastics, papers, solvents, lacquers, varnishes and gases (see 4.4). Frequent temperature changes may also have adverse effects.

Very long storage or unfavourable storage conditions often cause a change in speed, a reduction of contrast, and an increase of fog, or a combination of these effects. The degree of any change depends on the type of the emulsion. High-speed negative films age faster than slow-speed print films. In colour films, the ageing may affect each emulsion layer in a different way, so that unwanted changes of the colour balance may occur.

Changes caused by unfavourable storage conditions may be much bigger than any tolerances during manufacture of photographic films and papers. It is, therefore, extremely important to comply with the manufacturer's recommended storage conditions. For certain products the manufacturers specify an expiry date before which the product should be exposed and processed.

Films and papers should be exposed and processed as soon as possible after the original package has been opened. Opened packages should be resealed under controlled conditions for further storage.

4.2 Relative humidity

After manufacture, raw films and papers should be brought to equilibrium by the manufacturer at the appropriate relative humidity and placed in either a metal can or a paper or plastic container, sealed to provide a vapour barrier. Generally, the photographic material should be kept in moisture equilibrium with 40 % to 60 % relative humidity. The

container shall be kept sealed until the material is to be used.

The relative humidity of the storage area shall be maintained below 65 % because long exposure (exceeding one week) can damage storage containers (for example by rust), cause labels, tapes, and cartons to deteriorate, and encourage the growth of fungi. If the storage container is not perfectly waterproof, the relative humidity of the storage area shall be maintained between 30 % and 60 %. Long exposure to too low a relative humidity can make the films and papers temporarily brittle, while long exposure to too high a relative humidity can induce physical deterioration and cause adhesion between convolutions in a roll, damage to the container, labels, or cartons.

After exposure, and before processing, the photographic material shall be replaced in its container if it is not to be processed shortly. If the material is not to be processed within a week and it is practical to bring it to moisture equilibrium with 30 % to 60 % relative humidity, the container shall be sealed.

4.3 Temperature

Recommended temperatures during storage depend on the kind of radiation sensitive material and on the storage period. The general recommendations of the manufacturers are given in table 1. Additional information may be given on packages or be published by manufacturers.

For a keeping time of less than 1 month, photographic materials may be stored at any temperature not exceeding 25 °C with the exception of infrared sensitive colour films which shall be stored at − 18 °C.

Table 1 — Recommended storage temperature for films and papers

Storage temperature °C	Storage from 1 month to 6 months	Storage for more than 6 months
Below 21	Consumer films Professional B/W films Micrographic camera films Diazo films Vesicular films Graphic arts films (some) X-ray films (except IR) B/W papers	X-ray films (except IR) B/W papers
Below 13	Professional colour films Colour papers B/W motion picture films Colour motion picture films Aerial films Micrographic silver reversal duplicating films Graphic arts films (some)	Professional B/W films Professional colour films Colour papers Aerial films B/W motion picture films Colour motion picture films Diazo films Graphic arts films Consumer films Micrographic silver reversal duplicating films Micrographic camera films Vesicular films
− 18 to − 20	IR colour films Graphic arts films (some)	All films for very long storage

After exposure, and before processing, the photographic material shall be replaced in its container. If the material is not to be processed within 1 week, it shall be stored under the same or lower temperature conditions as for the raw material.

4.4 Gases

Storage rooms shall be protected against harmful gases such as hydrogen sulfide, sulfur dioxide, formaldehyde, oxidizing gases, industrial emissions and mercury vapour, which may penetrate the container seal and thereby fog or desensitize the photographic material. For X-ray films there shall be sufficient ventilation so that radon gas is evacuated. Materials shall not be stored in the same area as solutions of developers and activators.

4.5 Radiations

Photographic materials shall be protected against penetrating radiations until they are processed. Storage rooms and housing shall be measured for their radiation levels prior to being used.

For most photographic materials a maximum dose of 1 µGy/h is recommended. However, for films such as X-ray materials, the maximum may be 0,1 µGy/h. Some stones or stone aggregates in concrete can emit sufficient radiation to fog very sensitive film after long storage. However, films and papers are generally not damaged under normal conditions.

For checking baggage at airports, the radiation dosage in most instances is small. However, repeated exposures (greater than three) may cause damage to films. However, high speed film of ISO 1000 or more shall not be subjected to airport X-ray inspection.

5 Acclimatization

Packages of radiation sensitive films and papers should only be opened immediately before use. If materials have been stored at low temperatures, a warm-up period is necessary to prevent condensation on film or paper. The warm-up period depends on the size of the package, on its isolation, on the temperature difference (between storage and surround), and on the dew-point of the surround. Recommended periods are given in table 2. All values are for individual packages separated from each other with the exception of a carton containing ten 35 mm rolls. The length of material on a roll is less important than the thickness and insulation of the package.

Table 2 — Minimum recommended warm-up times

Films and papers	Warm-up time (in hours) for a temperature difference between storage and surround of	
	15 °C	40 °C
Short roll films, magazines and cartridges	1 to 1,5	1 to 2
Packages with 50 sheets	2	3
Single 16 mm rolls	0,5 to 1,5	1 to 2
Single 35 mm rolls	1,5 to 3	3 to 5
105 mm rolls	3 to 5	5 to 8
Aerial films	2 to 6	8 to 25
Large packages and large rolls	8 to 10	8 to 25
Carton with ten 35 mm rolls	10 to 30	30 to 45
X-ray films	10	25

6 Mechanical requirements

Rolls mounted on cores and packed in containers that are not specially designed shall be stored with the core axis vertical to avoid the weight of the roll exerting a pressure on the lower part of the roll and thereby causing physical damage. Boxes of sheet materials shall be stored with sheets in a horizontal position.

7 Conditions for handling

Climatic conditions of 20 °C to 24 °C and 40 % to 65 % relative humidity are recommended for handling in laboratories. In printing rooms the relative humidity should not be too low in order to prevent static discharges and the attraction of dust. In these cases, low humidity can also cause curl and temporary dimensional changes so that proper handling is no longer possible.

Excessive exposure to recommended safelights may degrade the sensitometry of some products. The manufacturer's literature should be consulted for recommended maximum cumulative exposure.

Air-conditioning systems in laboratories should be equipped with suitable dust filters.

Care shall be taken in the handling of large sheets of film or paper to avoid physical damage caused by sliding materials over one another, kinking, or fingerprinting. The wearing of lint-free cotton gloves is recommended.

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