BRITISH STANDARD

BS EN
13207:2001

# Silage thermoplastic films

The European Standard EN 13207:2001 has the status of a British Standard

ICS 65.040.20; 83.140.10

# National foreword

This British Standard is the official English language version of EN 13207:2001.

The UK participation in its preparation was entrusted to Technical Committee PRI/75, Plastic and rubber films and sheets, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

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This British Standard, having been prepared under the direction of the Sector Committee for Materials and Chemicals, was published under the authority of the Standards Committee and comes into effect on 15 May 2001

**Summary of pages**

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 8, an inside back cover and a back cover.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN 13207

March 2001

ICS 65.040.20; 83.140.10

English version

# Silage thermoplastic films

Films thermoplastiques d'ensilage

Thermoplastische Silagefolien

This European Standard was approved by CEN on 4 February 2001.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Ref. No. EN 13207:2001 E

## Foreword

This European Standard has been prepared by Technical Committee CEN/TC 249, Plastics, the Secretariat of which is held by IBN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2001, and conflicting national standards shall be withdrawn at the latest by September 2001.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom

## 1 Scope

This standard specifies the basic requirements for physical and mechanical characteristics of films used during the manufacture of silage and designed to last at least one year for protecting fodder.

The films are usually black, white or bicoloured (double face, black and white) and are made of polyethylene and/or ethylene copolymers.

## 2 Normative references

This European Standard incorporates by dated or undated references, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN ISO 527-1, *Plastics — Determination of tensile properties — Part 1: General principles (ISO 527-1:1993 including Corr 1:1994)*

EN ISO 527-3, *Plastics — Determination of tensile properties Part 3: Test conditions for films and sheets (ISO 527-3:1995)*

EN ISO 4892-2, *Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc sources (ISO 4892-2:1994)*

ISO 4591, *Plastics — Film and sheeting — Determination of average thickness of a sample and average thickness and yield of a roll by gravimetric techniques (gravimetric thickness)*

ISO 4592, *Plastics — Film and sheeting — Determination of length and width*

ISO 4593, *Plastics — Film and sheeting — Determination of thickness by mechanical scanning*

ISO 7765-1:1988, *Plastics film and sheeting — Determination of impact resistance by the free falling dart method — Part 1: Staircase methods*

## 3 Terms and definitions

For the purposes of this standard, the following terms and definitions apply.

**3.1**
**width**
total width of the film when laid flat, given in millimetres. Films which are wider than 2 000 mm are usually wound on a roll and folded lengthwise at least once

NOTE These folds are retained even when the film is laid out flat, and this may affect test results. Therefore, a distinction shall be made between the sample sheets taken from the folds (“fold” area) and sample sheets from areas which have not been folded (“flat area”).

**3.2**
**nominal width**
width declared by the manufacturer in mm

**3.3**
**thickness**
given in μm

**3.4**
**nominal thickness**
thickness declared by the manufacturer in μm

**3.5**
**length of the roll**
the largest dimension of the roll, in mm

**3.6**
**longitudinal direction of the roll (MD)**
direction parallel to the length of the roll, corresponding to the extrusion direction

**3.7**
**transverse direction of the roll (TD)**
direction parallel to the width (at right angle to the length)

## 4 Materials

Silage films in accordance with this EN standard are usually manufactured from:

— low density polyethylene (PE-LD), linear low density polyethylene (PE-LLD) and their blends;

— ethylene vinyl acetate copolymers (E/VAC), ethylene butylacrylate copolymers (E/BA) and their blends with PE-LD or PE-LLD.

## 5 Duration of the Silage film

The duration of a silage film is declared by the manufacturer and is determined testing the variation of his tensile strain at break after accelerated weathering (see 6.6).

The films are classified as:

— **class S1** when the duration is ≥ 2 000 h
— **class S2** when the duration is ≥ 3 000 h

## 6 Test methods

### 6.1 Appearance

The free edge of the roll shall be sealed with adhesive or by some similar mean, in order to prevent its unwinding.

The edges shall be properly in line and there shall be sufficient tension to prevent the layer of the roll from transverse slipping when it is handled (this shall be done horizontally).

### 6.2 Thickness

The thickness of the single points of the film and average thickness of the film shall be determined in accordance with ISO 4591 and ISO 4593 respectively.

### 6.3 Width

The width of the film shall be determined in accordance with ISO 4592.

### 6.4 Determination of tensile properties

The tensile properties shall be determined according to EN ISO 527-3 using a test specimen type 2, 10 mm wide, with a test speed of 500 mm/min. Test procedure shall refer to EN ISO 527-1.

### 6.5 Determination of impact resistance

The impact resistance (dart drop test) shall be determined in accordance with ISO 7765-1:1988 method A.

## 6.6 Resistance to artificial weathering

### 6.6.1 Principle

This measurement involves determining the variation of tensile strain at break of the film after exposure to a Xenon arc light source that simulates the spectral power distribution of solar light in accordance with EN ISO 4892-2 or with other correlated methods.

A sample of the film taken longitudinally (MD) is irradiated according to 6.6.2 for the time corresponding to the specified class (see clause 5). After irradiation, the tensile strain is determined on five rectangular specimens taken longitudinally (MD), 10 mm wide and 150 mm long, according to EN ISO 527-3.

### 6.6.2 Apparatus

The apparatus is described in EN ISO 4892-2. It consists of Xenon arc sources with a double borosilicate filter for simulating the direct sunlight.

Other test methods or test conditions may be used to check the film classification (as reported in 5), only when it can be shown that there is a correlation with the test method EN ISO 4892-2.

This may be useful when the ISO method test needs times which are too longs for testing.

### 6.6.3 Test conditions

The irradiance at the wave length of 34O nm is fixed at O,35 W/m2 x nm. In this condition the irradiance in the range (300 nm to 800 nm) is about 400 W/m2.

Spray cycle: duration of spraying 18 min $\pm$ 0,5 min, dry interval between spraying:min $\pm$ 0,5 min.

Black standard temperature 65°C ± 3°C.

Relative humidity (65 ± 5) %.

### 6.6.4 Procedure

A sample of film is irradiated according to 6.6.3 for 2 000 h for class S1 and for 3 000 h for class S2.

After irradiation, the tensile strain at break shall be determined according to EN ISO 527-3, using test specimens type 2 taken longitudinally (MD), 10 mm wide, with test speed of 500 mm/min.

### 6.6.5 Results

The arithmetic mean of the 5 measurements is calculated, and compared to the initial value of the tensile strain at break of the sample of the film.

The duration is in accordance with the considered class when the arithmetic mean is equal or greater than 50 % of the initial value.

## 7 Designation

Film designation shall include:

— usage of the film (silage film);
— colour of the film;
— type of basic polymers (PE-LD, PE-LLD, E/VAC, E/BA, etc);
— reference to this standard;
— width (mm);
— nominal thickness (μm);
— artificial weathering classification according to clause 5.

Example of designation of a silage film of PE LD 5 000 mm wide and 150 μm thick, black with artificial weathering duration of 2 000 h.

**Silage film black PE-LD EN ..... 5000 150 S1**

## 8 Marking

Marking along the edges of the film and roll shall at least include:

— designation;
— manufacture trade mark;
— manufacturing data (month and year).

## Table 1 — SILAGE FILM

| Properties | Unit | Nominal thickness of the film (μm) | | | Test method |
|---|---|---|---|---|---|
| | | ≥ 125 | ≥ 150 | ≥ 200 | |
| **Appearance and dimensional properties** | | | | | |
| **Appearance** | | **Regular** | | | |
| Average thickness tolerance vs nominal | % | ± 5 | | | ISO 4591 and ISO 4593 |
| Point to point thickness tolerance vs nominal | % | − 20 | | | |
| Width tolerance vs nominal | % | ± 2 | | | ISO 4592 |
| Length tolerance vs nominal | % | 0; +2 | | | ISO 4592 |
| **Mechanical properties** | | | | | |
| Tensile stress at break (MD − TD) | MPa | ≥ 17 | | | EN ISO 527-3 |
| Tensile strain at break (MD − TD) | % | ≥ 400 | | | |
| Dart Drop test Flat | cN | ≥ 300 | ≥ 300 | ≥ 400 | ISO 7765-1:1988 |
| Fold | cN | ≥ 140 | ≥ 190 | ≥ 300 | Method A |
| **UV ageing after 2 000 for class S1, and after 3 000 h for class S2** | | | | | |
| Tensile strain at break after exposition (MD) | % | ≥ 50 % initial value | | | See 6.6 |

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