SLOVENSKI STANDARD
SIST EN 14932:2018

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Nadomešča:
SIST EN 14932:2007

Polimerni materiali - Raztegljive plastomerne folije za zavijanje v bale

Plastics - Thermoplastic stretch films for wrapping silage bales

Kunststoffe - Thermoplastische Stretchofolien zum Umwickeln von Ballen

Plastiques - Films thermoplastiques étirables pour l'enrubannage de balles d'ensilage

Ta slovenski standard je istoveten z: EN 14932:2018

ICS:

55.040	Materiali in pripomočki za pakiranje	Packaging materials and accessories
83.140.10	Filmi in folije	Films and sheets

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English Version

Plastics - Thermoplastic stretch films for wrapping silage bales

Plastiques - Films thermoplastiques étirables pour l'enrubannage de balles d'ensilage

Kunststoffe - Thermoplastische Stretchfolien zum Umwickeln von Silage-Ballen

This European Standard was approved by CEN on 20 November 2017.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 14932:2018) has been prepared by Technical Committee CEN/TC 249 “Plastics”, the secretariat of which is held by NBN.

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of an identical text or by endorsement, at the latest by July 2018, and conflicting national standards shall be withdrawn at the latest by July 2018.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN not be held responsible for identifying any or all such patent rights.

This document supersedes EN 14932:2006.

In comparison with the previous edition, the following technical modifications have been made:

— classification according to the solar reflectance is changed;

— durability makes reference to the exposure of films by artificial weathering;

— optional characteristics are introduced by revised annexes;

— paragraphs on instructions for use, for disposal and end-of-life of stretch films have been added.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

The biological and practical requirements for silage stretch films and the interactions with the machinery, used for the wrapping and handling of round bales and square bales, have been considered for the design of this standard. However, it is difficult to simulate in laboratory conditions some parameters like leak tightness, oxygen permeability, temperature and the manner they interact.

In order to obtain silage of high quality it is essential to reduce unwanted microbiological activities to very low levels. It is necessary to limit the penetration of oxygen of air inside the bale in order to create the best conditions for conservation. Consequently, the wrapped bale should be as gas tight as possible.

This European Standard does not include as mandatory a test method for the determination of air tightness and oxygen permeability on artificial bale. Nevertheless, it is recommended for the manufacturers of stretch films to check this property near an appropriate testing laboratory.

There are discussions regarding how the temperature inside the bale will influence how different types of “good” and “bad” microbiological activities will develop in forage. Although the film can be made of any colour, it is a fact that the pigmentation or colour itself will influence the temperature inside the bale, due to sun-radiation. Therefore, this standard also includes a method for the determination of the solar reflectance of stretch films [1].

1 Scope

This European Standard specifies the requirements for dimensional, mechanical, oxygen transmission rate and optical characteristics of stretch thermoplastic films for wrapping bales used for ensilaging of forage. It specifies a classification for solar reflectance of the films.

This European Standard specifies also test methods to check these requirements.

It specifies also test methods for the determination of the airtightness and oxygen permeability determined on a wrapped artificial bale.

This European Standard is applicable to white, black or coloured films based on polyolefin materials. It covers the width range from 250 mm up to 1 000 mm.

The performances of the stretch films in conformance with this European Standard are based on the use of at least six layers of films, pre-stretched at a ratio between 60 % and 70 % for round bales and a ratio of 55 % and 65 % for wrapping square bales.

This European Standard also gives guidance for storage of rolls and instructions for wrapping, storage of wrapped bales and for disposal of films.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

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

EN ISO 4892-2:2013, *Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc lamps (ISO 4892-2:2013)*

EN ISO 6383-2, *Plastics — Film and sheeting — Determination of tear resistance — Part 2: Elmendorf method (ISO 6383-2)*

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

EN ISO 13468-2, *Plastics — Determination of the total luminous transmittance of transparent materials — Part 2: Double-beam instrument (ISO 13468-2)*

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

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

ISO 9845-1:1992, *Solar energy — Reference solar spectral irradiance at the ground at different receiving conditions — Part 1: Direct normal and hemispherical solar irradiance for air mass 1,5*

ISO 15105-2:2003, *Plastics — Film and sheeting — Determination of gas-transmission rate — Part 2: Equal-pressure method*

3 Terms and definitions

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

3.1
width
total film width when laid flat

Note 1 to entry: It is expressed in millimetres (mm).

3.2
nominal width
W_0
film width, as declared by the manufacturer

Note 1 to entry: It is expressed in millimetres (mm).

3.3
nominal thickness
film thickness, as declared by the manufacturer

Note 1 to entry: It is expressed in micrometres (µm).

3.4
film length
largest dimension of a film corresponding to the length of the unwinded roll (or reel)

Note 1 to entry: It is expressed in metres (m).

3.5
nominal length
L_0
length of the film, as declared by the manufacturer

Note 1 to entry: It is expressed in metres (m).

3.6
longitudinal direction
MD
direction parallel to the film length corresponding to the extrusion direction

3.7
transverse direction
TD
direction parallel to the film width (at right angles to the length)

3.8
core protrusion
C_p
distance from the edge of a roll to the edge of its core

Note 1 to entry: It is expressed in millimetres (mm).

3.9
neck-in
N_i
shrinkage of a film in the transverse direction (TD) induced by stretching the film in longitudinal direction (MD)

Note 1 to entry: It is expressed as a %.

3.10
radiant exposure
H
time integral of irradiance

Note 1 to entry: It is expressed in ($J \cdot m^{-2}$)

[SOURCE: ISO 9370:2017, 3.27 [2]]

4 Materials

Stretch films for wrapping silage bales according this European Standard are usually manufactured from polyolefin materials.

5 Solar reflectance

The stretch silage films shall be classified in two classes "High reflectance" or "Low reflectance" according to the solar reflectance, as defined in Table 1.

The solar reflectance shall be determined according to Annex C by using one layer of unstretched film [2].

The class of solar reflectance shall be declared by the manufacturer.

Table 1 — Classification according to the solar reflectance

Class of film	Solar reflectance Rs %
High reflectance	≥ 24
Low reflectance	< 24

6 Durability

The durability of stretch forage films shall be declared by the manufacturer in kLy[1].

The duration of exposure of the film shall be determined by an artificial weathering using xenon-arc lamps, conforming to 8.11, which induces a decrease of the value of tensile strain at break equal or less than 50 % of the initial value.

Other light sources may be used provided that a correlation between the test results obtained with these light sources and these obtained after a natural exposure can be demonstrated. Details of these methods are given in Annex A (informative).

In case of dispute, the exposure to xenon-arc lamps according to 8.11 shall be used.

[1] 1kLy = 0,04184 GJ/m²

NOTE A numerical correlation between durability of stretch films exposed to artificial weathering and natural exposure is given in Annex B (informative).

7 Requirements

7.1 General requirements

Stretch silage films shall fulfil the requirements given in Table 2.

Table 2 — Requirements for stretch silage films

Characteristics	Unit	Requirements	Test method subclause
Appearance		Shall conform to 7.2	7.2
Tolerance of average thickness/nominal thickness	%	from −8 to 12	8.1
Tolerance of single point thickness/nominal thickness	%	from −20 to 28	8.1
Width tolerance	mm	$W_0 - 5 \leq W \leq W_0 + 5$	8.2
Core protrusion	mm	$3 \leq C_p \leq 10$	8.3
Film length	m	≥ 99,0 % of nominal roll length	8.4
Neck in during film stretching	%	< 25	8.5
Tensile stress at break			8.6
MD	MPa	≥ 25	
TD	MPa	≥ 23	
Tensile stress at yield			8.6
MD	MPa	≥ 9	
Tensile strain at break			8.6
MD	%	≥ 400	
TD	%	≥ 600	
Impact resistance	g	≥ 150	8.7
Tightening force	N	≥ 8,75	8.8
Tear resistance			8.9
MD	cN	≥ 120	
TD	cN	≥ 600	
Total luminous transmittance	%	< 50	8.10
Oxygen transmission rate [a] (expressed as for one layer of unstretched film)			8.12
For film with solar reflectance [b] ≥ 24 %	$cm^3/(m^2$	< 10 000	

Characteristics	Unit	Requirements	Test method subclause
For film with solar reflectance [c] ≥ 10 % and < 24 %	·24h·bar [e]) $cm^3/(m^2 \cdot 24h \cdot bar^e)$	< 9 500	
For film with solar reflectance [d] < 10 %	$cm^3/(m^2 \cdot 24h \cdot bar^e)$	< 8 500	

[a] A commonly used unit for the oxygen gas transmission rate is the cm^3 (STP)/(m^2 · d) at one atmosphere pressure differential, where: 1cm^3 at Standard Temperature and Pressure (STP = 273,15K; 1,013 × 10^5 Pa) is 44,62 µmol and one day is 86,4 × 10^3 s . The oxygen transmission rate in mol/(m^2 · s · Pa) is abstained multiplying the value in cm^3 (STP)/(m^2 · d) by 5,165 × 10^{-10}.

[b] Example white and light green films

[c] Example dark green films

[d] Example black films

[e] 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm^2

7.2 Requirement for visual inspection

The edges of the reels shall be straight.

Bubbles and wrinkles on the reel and visible defects on the film which affect the proper use of the film shall be limited.

7.3 Optional characteristics

7.3.1 Airtightness and oxygen permeability determined on a wrapped artificial bale

NOTE 1 The quality of silage is strongly depending on the global airtightness of wrapped bales. Several parameters can influence the global airtightness results: measurable properties such as the permeability cling force or tightening force of the film and also properties difficult to quantify by means of laboratory equipments, such as wrinkles, tiger stripes or film appearance when stretched.

NOTE 2 At the date of publication of this standard, there is no European or international standardized method to determine the airtightness and the oxygen permeability by wrapping an artificial bale.

Guidance for assessing the airtightness and the oxygen permeability of a stretch silage film by wrapping an artificial bale is given in Annex F.

The oxygen permeability is defined in Annex F as the amount of permeated oxygen (from the atmosphere) through the artificial bale per 100 h.

The airtightness is defined in Annex F as the time for the internal pressure to increase from −500 Pa to −100 Pa.

7.3.2 Adhesion

NOTE Adhesion is a major property of stretch films for wrapping silage bales but no specific method has been developed for this application.