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Plastics sacks for household waste collection — Types, requirements and test methods

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National foreword

This British Standard is the UK implementation of EN 13592:2017. It supersedes BS EN 13592:2003 which is withdrawn.

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Plastics sacks for household waste collection - Types, requirements and test methods

Sacs en plastique pour la collecte des déchets ménagers - Types, exigences et méthodes d'essai

Kunststoffsäcke für die Abfallsammlung aus Haushalten - Typen, Anforderungen und Prüfverfahren

This European Standard was approved by CEN on 21 November 2016.

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European foreword

This document (EN 13592:2017) has been prepared by Technical Committee CEN/TC 261 “Packaging”, the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by August 2017, and conflicting national standards shall be withdrawn at the latest by August 2017.

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1 Scope

This European Standard specifies the general characteristics, test methods and requirements for sacks, bags and bin liners, made from plastic films, used for household waste collection, or household selective waste collection including the collection of biodegradable waste for organic recycling (biodegradation and composting).

For the purpose of this European Standard biodegradable and compostable sacks, including ties if any, are those which comply with EN 13432.

This European Standard applies only to sacks, bags and bin liners for which the first use is for household waste collection or household selective waste collection.

This European Standard does not apply to sacks used to protect bins and that are not lifted at the emptying operation and thus do not require the same mechanical characteristics.

NOTE For editorial reasons, in this document the terms “sack” and “bag” are synonymous.

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 13432, *Packaging — Requirements for packaging recoverable through composting and biodegradation — Test scheme and evaluation criteria for the final acceptance of packaging*

EN 22248, *Packaging — Complete, filled transport packages — Vertical impact test by dropping (ISO 2248)*

EN ISO 291, *Plastics — Standard atmospheres for conditioning and testing (ISO 291)*

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 1043-1, *Plastics — Symbols and abbreviated terms — Part 1: Basic polymers and their special characteristics (ISO 1043-1)*

EN ISO 7965-2, *Sacks — Drop test — Part 2: Sacks made from thermoplastic flexible film (ISO 7965-2)*

ISO 4591:1992, *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 4593, *Plastics — Film and sheeting — Determination of thickness by mechanical scanning*

3 Terms and definitions

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

3.1
household waste
non dangerous waste from household or from industrial activities or service activities, collected in the same conditions

Note 1 to entry: To prevent damage to the sacks, unwrapped broken glass and unwrapped items with sharp edges are not normally placed in them.

3.2
selective waste collection
SWC
collection of some flows of waste, separated beforehand by producers with the view of valorisation or specific treatment

3.3
standard sack
open mouthed sack

3.4
drawtight sack
sack with a tie inserted in its top, allowing it to be closed and, in some cases, be carried

3.5
four flaps sack
sack with four flaps used for closure by knotting

3.6
strapsack
sack with two or four unsealed straps that can be used as tie for closure and as handles to carry it

3.7
T-shirt sack
sack with sealed handles

3.8
star sealed sack
sack folded before sealing in addition to gusset folds

3.9
gusset
fold or series of folds inserted in the longitudinal edge or in the bottom of a sack

3.10
tie
any item incorporated by design or added, used to close a sack

Note 1 to entry: For example: tapes, clips and wire ties.

3.11
useful length
L
distance from the bottom to the mouth of a sack, measured inside the sack lying flat

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

3.12
useful width
P
internal width of a sack, measured with gussets unfolded, if any

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

3.13
nominal thickness
N_t
thickness of the film constituting a sack, as declared by the manufacturer or agreed upon in a contract

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

Note 2 to entry: nominal thickness is not the only parameter impacting the performance of the sacks

3.14
longitudinal direction
MD
direction parallel to the extrusion machine direction of the film

3.15
transverse direction
TD
direction perpendicular to the extrusion machine direction of the film

4 Designation

Sacks are designated using the following information:

a) use, i.e. household waste collection sacks, household waste selective collection sacks, specific test loads (if any) and, any other information if there is an agreement between the supplier and customer;

b) the dimensions, in millimetres (mm) (see Clause 5);

c) the type:
   1) standard sacks;
   2) drawtight sacks;
   3) T-shirt sacks;
   4) strap sacks;
   5) four flap sacks;
   6) star sealed sacks.

NOTE The above list of types of sacks is neither restrictive nor exhaustive.

d) the abbreviated term of the plastic material from which the sack is made of, in accordance with EN ISO 1043-1, and the colour of the sack;

   Colour is a basic information for the designation of a sack, e.g. black, blue, green, white. When no pigment, filler or coloured master batch is incorporated in the resin, it is designated as "neutral". When a more accurate definition of colour is needed, it should be specified in the contract with a reference to the relevant specification or standard.

e) the nominal thickness of the film, N_t, in micrometres (μm);

f) a reference to this European Standard, i.e. EN 13592;

g) a reference to EN 13432, for sacks for the separate collection of biodegradable waste for organic recycling (biodegradation and composting).

EXAMPLES OF DESIGNATION

EXAMPLE 1 Household waste collection sack, 700 mm x 1 100 mm, standard, in polyethylene, white, 40 μm thick:

"Household waste collection sack – EN 13592 — 700/1100 - Standard - PE - White – 40 μm"

EXAMPLE 2 Household selective waste collection drawtight sack, 600 mm x 800 mm, in polyethylene, neutral, 30 μm thick for specific load of 4 kg both for drop test and closing device test:

"Household selective waste collection sack for 4 kg – EN 13592 — 600/800 - Drawtight - PE - Neutral – 30 μm "

EXAMPLE 3 Organic waste collection with biodegradable and compostable sacks, 500 x 600 mm, standard, neutral 20 μm:

"Biodegradable and compostable sack EN 13592 — EN 13432 — 500/600 - Standard - Neutral – 20 μm"

5 Dimensions

The dimensions of the sacks shall be agreed between the supplier and the customer, unless otherwise specified in this standard.

The dimensions of sacks are given by two separate numbers, the first number giving the useful width, *P*, in millimetres, (see 3.12) and the second number the useful length, *L*, in millimetres (see 3.11).

EXAMPLE Reference 500x700 (500/700) for a sack with P = 500 mm and L = 700 mm.

6 General

Clause 7 gives the requirements for sacks for the collection of household waste except for the separate collection of biodegradable waste for organic recycling (biodegradation and composting) and the corresponding test methods.

In order to take into account the specificities of biodegradable waste and organic recycling, Clause 8 gives the requirements for sacks for the separate collection of biodegradable waste for organic recycling (biodegradation and composting). The corresponding test methods are given either in 7.2 when they are identical to those for sacks covered in Clause 7 or in 8.2 for the specific test methods or any deviation from the test methods given in 7.2.

Sampling shall be performed according to Annex B.

7 Sacks for the collection of household waste, except for the separate collection of biodegradable waste for organic recycling

7.1 Requirements

7.1.1 Sampling

The number of sacks for each test is specified in Table B.1.

7.1.2 Useful width and useful length

The minimum useful width, measured on the sack, shall not be less than the minimum value:

P-2,5 % or P-10 mm

The minimum useful length, measured on the sack, shall not be less than the minimum value:

L-2,5 % or L-10 mm

No defective sacks shall be permitted out of 10 sacks when tested according to 7.2.2.2 and 7.2.2.3.

7.1.3 Film thickness

7.1.3.1 General

When tested according to 7.2.3, each sack shall satisfy the requirements for the individual values specified in 7.1.3.2 and for the average values specified in 7.1.3.3.

7.1.3.2 Individual values

No individual value of the film thickness measured in micrometres (µm) shall be less than:

$N_t - x$

where x is the minimum value of:

$\frac{15N_t}{25 + N_t}$ or $0{,}35N_t$,

rounded to the nearest upper or lower unit, in micrometres (µm) (e.g. 1,4 as 1 µm; 1,5 as 2 µm; 1,6 as 2 µm)

7.1.3.3 Average values

The arithmetic average value of the film thickness, calculated according to either 7.2.3.2 or 7.2.3.3, shall be:

a) > N_t –5 %, when N_t > 20 µm;

b) > N_t –8 %, when $N_t \leq 20$ µm.

7.1.4 Opacity

7.1.4.1 General

Unless otherwise specified, the individual and average values of the opacity shall be in accordance with 7.1.4.2 and 7.1.4.3.

No defective sack shall be permitted out of 10 sacks (or strips) for individual values of each sack (or strip) and the average value of the 10 measurements when tested according to 7.2.4.1.

In case of a specific agreement between the supplier and the customer, the opacity of household waste collection sacks may be checked by applying the method according to 7.2.4.2 and satisfying the criteria given 7.2.4.2.

7.1.4.2 Individual values

No individual value of the opacity shall be:

a) ≤ 55 % for household waste collection sacks;

b) ≥ 45 % for household selective waste collection sacks.

7.1.4.3 Average value

The arithmetic average value of the opacity calculated for 10 measurements shall be:

a) ≥ 60 % for household waste collection sacks;

b) ≤ 40 % for household selective waste collection sacks.

7.1.5 Resistance to leakage

No defective sack shall be permitted out of five sacks when tested according to 7.2.5.

7.1.6 Drop impact resistance

7.1.6.1 Sacks for household waste collection

No more than three defective sacks shall be permitted out of 20 sacks when tested according to 7.2.6.

If this requirement is not satisfied, then 10 additional sacks shall be tested according to 7.2.6 and in total no more than five defective sacks out of the 30 sacks shall be permitted.

7.1.6.2 Sacks for selective waste collection

Unless otherwise specified in an agreement between the supplier and the customer specifying different test loads, the test loads given in Table 2 shall be applied.

No more than three defective sacks shall be permitted out of 20 sacks when tested according to 7.2.6.

If this requirement is not satisfied, then 10 additional sacks shall be tested according to 7.2.6 and in total no more than five defective sacks out of the 30 sacks shall be permitted.

7.1.7 Resistance of the closing device

7.1.7.1 Tensile strength of ties

For sacks provided with an integrated or added tie, the tensile strength of the tie when measured according to 7.2.7.1 shall not be less than 40 N.

No more than one failure out of the 10 ties tested is permitted.

When the ties are not integrated to the sacks, the number of ties shall not be less than the number of sacks.

7.1.7.2 Resistance of the closing system of drawtight sacks

No more than two defective sacks out of 10 shall be permitted when tested according to 7.2.7.2.

For sacks for selective waste collection if there is an agreement between the supplier and the customer specifying different test loads (see 7.1.6.2), these agreed test loads shall be applied. In the absence of an agreement between the supplier and the customer, the test loads according to Table 3 shall be applied.

7.2 Test methods

7.2.1 Atmosphere for conditioning and testing

Unless otherwise specified, the specimens shall be tested at room temperature, between 10 °C and 30 °C. The test temperature shall be recorded.

7.2.2 Dimensions

7.2.2.1 Apparatus

7.2.2.1.1 Rule, capable of measuring to an accuracy of 1 mm.

7.2.2.1.2 Thickness measuring device, as specified in ISO 4593 with an accuracy of 1 µm.

7.2.2.1.3 Balance, capable of measuring to an accuracy of 0,01 g.

7.2.2.2 Useful length

When the sack is laid flat, measure internally the useful length *L* along the two edges from the top (opening) of the sack to the bottom seam, or to the bottom of the sack for sacks without a bottom seam.

All the measured values, expressed in millimetres, shall be rounded to the nearest unit. Measured values of 0,5 shall be rounded up to the next greater 1 mm.

The useful length *L* is the arithmetic mean of the two measurements, expressed in millimetres (mm).

The useful length *L* of the different types of sacks is shown in Figure A.1.

Repeat the procedure for each sack.

7.2.2.3 Useful width

For sacks with gussets, cut the bottom seam and unfold the gussets.

When the sack is laid flat, measure the useful width *P* at mid-length between the top and the bottom of the sack.

In the case of sacks with edge seams, the useful width shall be measured between the inner sides of the seams.

The useful width *P* of the different types of sacks is shown in Figure A.1.

All the measured values, expressed in millimetres, shall be rounded to the nearest unit. Measured values of 0,5 shall be rounded up to the next greater 1 mm.

Repeat the procedure for each sack.

7.2.3 Film thickness

7.2.3.1 General

The film thickness shall be measured according to 7.2.3.2 (method using a thickness measuring device). If the arithmetic average value of the measurements of 10 strips is greater than $1{,}10 \times N_t$, then the method according to 7.2.3.3 (gravimetric method) shall be applied to determine the average film thickness.

Individual film thicknesses shall be measured only by using a thickness measuring device.

All the measured values, expressed in micrometres, shall be rounded to the nearest unit. Measured values of 0,5 shall be rounded up to the next greater 1 µm.

7.2.3.2 Thickness measuring device method

This test shall be performed using 10 strips, 100 mm to 120 mm wide, cut from each of the ten sacks from Group I.

Whatever the type of sack, the strips shall be cut with their length perpendicular to the direction of extrusion (see Annex A):

a) for sacks with bottom seam, cut the strips at mid-length all the way round the sacks;

b) for sacks without bottom seam, cut the strips at mid-width all the way round of the extruded film which means from the top to bottom of the two sides of the sack.

Keep the remaining parts of these sacks for the measurement of the opacity.

By using the thickness measuring device, measure the thickness along the strip, the spacing between two measurements being approximately 30 mm and record each individual measurement.

Repeat the procedure for each sack.

Calculate the arithmetic mean value for the ten strips, expressed in micrometres (µm).

7.2.3.3 Gravimetric method

Cut out one strip of (100 ± 0,5) mm width from each of the five sacks from Group V, in the transversal direction and in the middle of the sack.

Measure the length l_i of each strip by using the rule.

Calculate the total length of the five strips, l_t.

Weigh together the five strips p_t with the balance.

Calculate the average value of the film thickness, t, by using the following formula:

$$t = \frac{1}{0{,}0001 \times l_t \times \rho} p_t$$

where

t is the average film thickness, in micrometres;

l_t is the total length of the five strips, in millimetres;

p_t is the weight of the five strips, in grams;

ρ is the density of the film material, expressed in grams per cubic centimetres.

7.2.4 Opacity

7.2.4.1 Standard method

7.2.4.1.1 General

The opacity of a film is calculated by using the following formula:

$$100\frac{(I_0 - I_1)}{I_0}$$

where

I_1 is the illuminance of the transmitted light through the test specimen, expressed in lux;

I_0 is the illuminance of the light, i.e. without the test specimen, expressed in lux.

The illuminance shall be measured by using the apparatus defined in 7.2.4.1.2.

7.2.4.1.2 Apparatus

7.2.4.1.2.1 Reference apparatus

The apparatus, shown in Figure 1a) consists of:

a) a matt black base plate supporting a photoelectric cell, with a surface over which the test specimen can be placed;

b) a light source, with a spectrum as close as possible to that of white light, adjustable to a reading of 1 000 lx on the photoelectric cell.

The photoelectric cell is positioned at a distance of (3 ± 0,5) cm from the surface of the test strip and a matt black diaphragm of (1 ± 0,1) cm diameter is placed on the photo-electric cell.

The characteristics of the photoelectric cell shall be as follows:

c) type: siliceous photo-electric cell;

d) bias error: 3 %;

e) relative spectral response, $V\lambda$, with a maximum deviation of 10 % from the curve related to the photonic brightness.

The illuminance of the ambient light, without test specimen and the light source not activated, shall be less than 10 lx.

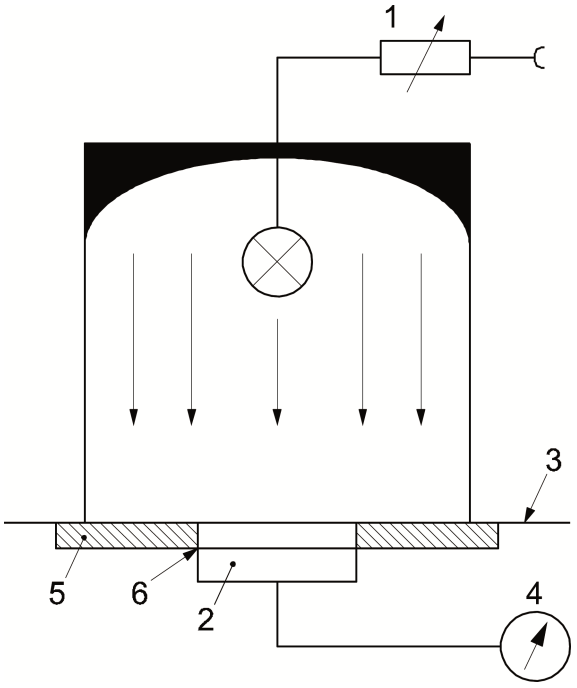
7.2.4.1.2.2 Other apparatus

Testing may also be carried out by using the following apparatus (see Figure 1b)) consisting of:

a) a matt black base plate holding a 60 mm minimum diameter photo-electric cell, with a surface over which the test sample can be placed;

b) a light source, with a spectrum as close as possible to that of white light, adjustable to a reading of 1 000 lx on the photoelectric cell.

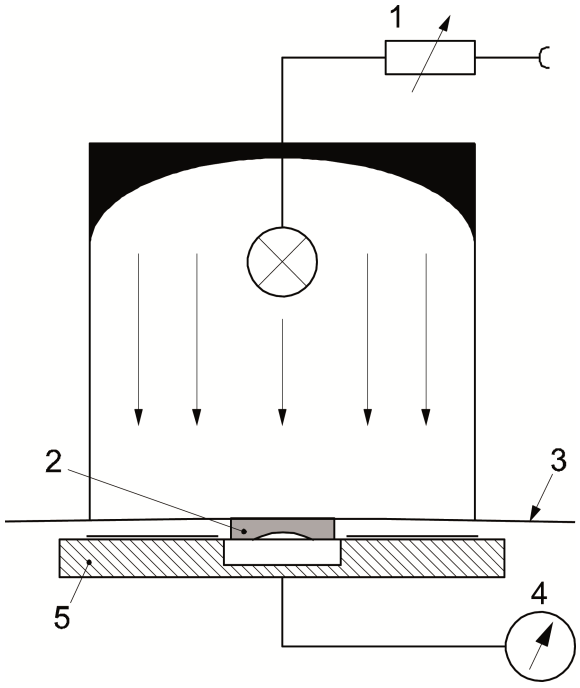
The illuminance of the ambient light, without test specimen and the light source not activated, shall be less than 10 lx.



Key

1 variable power supply
2 photoelectric cell
3 plastic film test specimen
4 light meter
5 matt black base of (3 ± 0,5) cm thickness
6 matt black diagram of (1 ± 0,1) cm diameter

a) Reference apparatus



Key

1 variable power supply
2 photoelectric cell
3 plastic film test specimen
4 light meter
5 matt black base

b) Other apparatus

Figure 1 — Typical apparatus for the control of opacity

7.2.4.1.3 Procedure

This test shall be performed using 10 strips, 100 mm minimum wide, cut from each of the 10 sacks from Group I in the same way as for those for the thickness test, avoiding printed areas as far as possible.

Turn on the light source and wait 5 min for the stabilization of the light.

Set up the light, using the variable power supply, to an illuminance, as measured by the photo electric cell, such that l_o = 1 000 lx.

Place the test specimen with the inner side of the sack on the cell and record the illuminance of the transmitted light, l_1, looking for:

a) for household waste collection and pre-collection sacks, the lowest value over the entire area of the test specimen;

b) for household selective waste collection sacks, the highest value over the entire area of the test specimen.

Express the result as a percentage, rounded to the nearest integer. For example, for a value of 38,5 %, the result is 39 %.

Repeat the procedure for each sack.

7.2.4.2 Alternative opacity test method

The film shall prevent the reading of black upper case letters, body 5 mm, font Verdana, printed on a white paper sheet placed in contact of the film on a horizontal opaque plane. The test specimen shall be placed with the inner side of the sack towards the paper sheet.

7.2.5 Resistance to leakage

7.2.5.1 Apparatus

7.2.5.1.1 Adequate support.

7.2.5.1.2 Tap water.

7.2.5.1.3 Wet mixture, prepared from one volume of tap water and one volume of wood sawdust. The volumes of water and wet mixture for testing are given in Table 1.

When *P* and *L* are on different columns, take the highest figure for the determination of the volumes of tap water and wet mixture.

Table 1 — Volume of materials for testing

	Volume l		
	$P \leq 400$ and $L \leq 400$	$400 \leq P \leq 520$ and $400 \leq L \leq 700$	$P > 520$ or $L > 700$
Tap water	2	3	6
Mixture of water and saw dust (50/50 in volume)	2	3	6

7.2.5.2 Procedure

When sacks are supplied with a tie sealed to the sack, the tie shall not be removed before performing this test.

Pour into a sack 2 l, 3 l or 6 l of water, as applicable (see Table 1). Hang up the sack by the top to the support and monitor the sack for 5 min, for any evidence of leak.

If a drop leaks within these 5 min, start counting the number of drops, *n*, escaping from the sack during 1 min:

a) If *n* is less than or equal to 20, the sack is declared “conform”;

b) If *n* is greater than 20, proceed with the second step, using the same sack.

Prepare 2 l, 3 l or 6 l, as applicable (see Table 1) of the wet mixture, as defined in 7.2.5.1.3.

Pour the volume of the wet mixture in the sack. Hang up the sack by the top to the support and monitor the sack for 5 min, for any evidence of leak.

Count the number of drops, *n*, if any, escaping from the sack during 1 min.

If *n* is less than or equal to 20, the sack passes is declared “conform”.

If *n* is greater than 20 or if all water escaped during the first 5 min, the sack is declared “non-conform”.

Repeat the procedure for each sack.

7.2.6 Drop impact resistance

7.2.6.1 Principle

The test is intended to determine the overall suitability of the sack when it is filled to its maximum useful capacity.

Sacks, loaded with specified test loads according to the dimensions of the sacks, are dropped from a height of (1,20 ± 0,01) m on a flat and smooth surface. Then the sacks are inspected.

7.2.6.2 Apparatus

7.2.6.2.1 Drop testing machine

The drop test machine shall be as specified in EN 22248 and EN ISO 7965-2.

7.2.6.2.2 Test load (ballast)

The test load (ballast) consisting of a specified number of cotton or jute bags, filled with PE low density granules for a total mass of (500 +10,0)g each and, if needed, one bag filled with PE low density granules for a total mass of (250 +10,0) g.

The cotton or jute bags shall be closed by stitching them across their entire width, at least 40 mm from their opening.

Dimensions of the bags up to the stitching are: (180 ± 10) mm x (280 ± 10) mm.

The number of bags and test loads according to the dimensions of the sacks are given in Table 2.

When *P* and *L* are not in the same row in Table 2, the test load to be applied shall be the mean value of the test loads required for the corresponding *P* and *L*.

EXAMPLE For a sack with *P* = 500 mm and *L* = 650 mm, test load = 4 500 g ((3 000 + 6 000)/2).

Table 2 — Test loads for drop test

Useful width *P* mm	Useful Length *L* mm	Number of ballast bags	Test load g
$P \leq 400$	$L \leq 400$	3	1 500
$400 < P \leq 520$	$400 < L \leq 600$	6	3 000
$520 < P \leq 600$	$600 < L \leq 800$	12	6 000
$600 < P < 700$	$800 < L < 900$	20	10 000
$P \geq 700$	$L \geq 900$	36	18 000

7.2.6.2.3 Balls

40 mm diameter balls for checking the sacks after impact when $P \leq 520$ mm.

61 mm diameter balls for checking the sacks after impact when $P > 520$ mm.

7.2.6.3 Procedure

Fill the sack with the test bags, in conformance with Table 2. Then gently deflate the sack before closing.

Close the sack with an appropriate closing system. It shall be closed at approximately 100 mm from the opening of the sack when the closing system is not part of the bag itself or 50 mm from the opening for sacks with a useful width, *P*, less or equal to 520 mm.

For standard sacks carefully remove the ties, if any, from the bottom of the sacks.

For other sacks, their own closing system shall be used.

Place the sack with the load on the trap of the testing machine (7.2.6.2.1) in such a position that the bottom of the sack is (1,20 ± 0,01) m over the test surface.

Drop the sack once on its bottom.

Inspect the sack for tears or ruptures before removing the test bags from the sack. Determine whether or not the tears allow the passage of a 40 mm or 61 mm diameter ball (see 7.2.6.2.3).

Repeat the procedure for each sack.

For each sack submitted to testing, the test report shall mention either:

— no tear;

or

— the diameter of the ball used for testing tears and the result, as “Pass” or “Fail”. A failure being recorded when the relevant ball passes through the tear.

7.2.7 Resistance of the closing system

7.2.7.1 Tensile strength of the tie

The tensile strength of the tie shall be measured using a testing machine as specified in EN ISO 527-3 with a test speed of 500 mm/min.

7.2.7.2 Resistance of the closing system of drawtight sacks

7.2.7.2.1 Principle

The test is intended to verify that the strength of the closing system when the sack, filled to its specified test load, is picked up.

Sacks loaded with specified test loads according to the dimensions of the sacks are submitted to a severe retained hanging.

7.2.7.2.2 Apparatus

Hanging hook, rigidly fixed as shown in Figure 2, and drop testing machine as specified in EN 22248 and EN ISO 7965-2.

Dimensions in millimetres

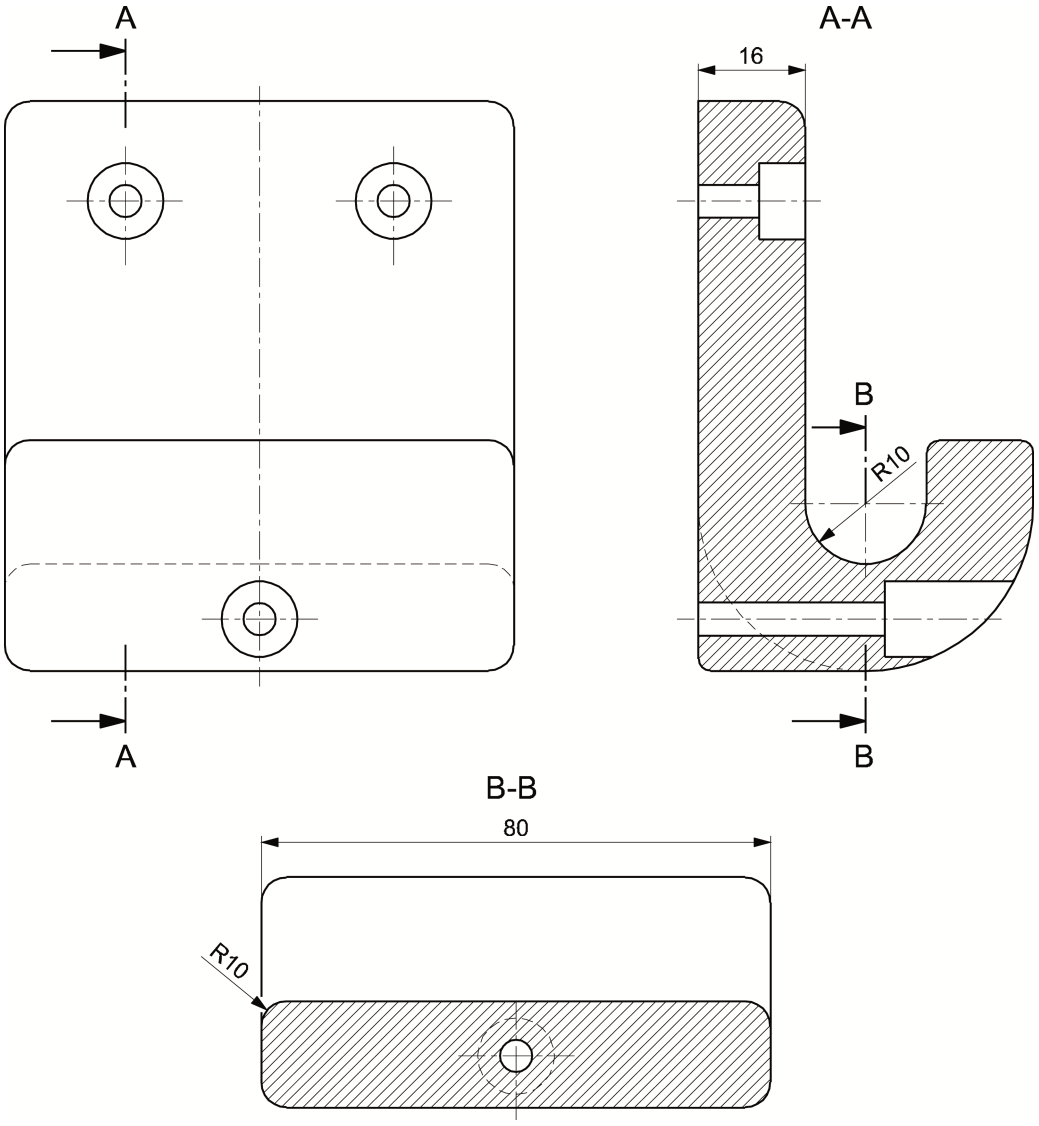


Figure 2 — Hanging hook

7.2.7.2.3 Test load (ballast)

Test loads consisting of bags as defined in 7.2.6.2.2 shall be used.

The number of bags and test loads according to the dimensions of the sacks are given in Table 3.

When *P* and *L* are not in the same row in Table 3, the test load to be applied shall be the mean value of test loads required for the corresponding *P* and *L*.

EXAMPLE For a sack with *P* = 500 mm and *L* = 650 mm, test load = 4 500 g ((3 000 + 6 000)/2).

Table 3 — Test loads for resistance of the closing system

Useful width *P* mm	Useful Length *L* mm	Number of ballast bags	Test load g
$P \leq 400$	$L \leq 400$	3	1 500
$400 < P \leq 520$	$400 < L \leq 600$	6	3 000
$520 < P \leq 600$	$600 < L \leq 800$	12	6 000
$600 < P < 700$	$800 < L < 900$	20	10 000
$P \geq 700$	$L \geq 900$	30	15 000

7.2.7.2.4 Procedure

Fill the sack with the test loads according to Table 3. Pull the tie until the sack is closed, but without knotting. Place the loaded sack on the apparatus, as shown on Figure 3. The plate shall be at a distance from the ground such that the sack does not come in contact with the ground when performing the test except in the case of a failure (see Figures 3 and 4).

Attach the sack to the hook using the tie or the integrated hanging system in such a manner that they hang without stretching.

Using the trap, allow the sack to fall once.

Repeat the procedure for each sack.

7.2.7.2.5 Expression of the results and test report

The following ruptures shall be considered as failures (see Figure 4):

— break of the seam retaining the tie or the hanging system;

— break of the tie or its seals;

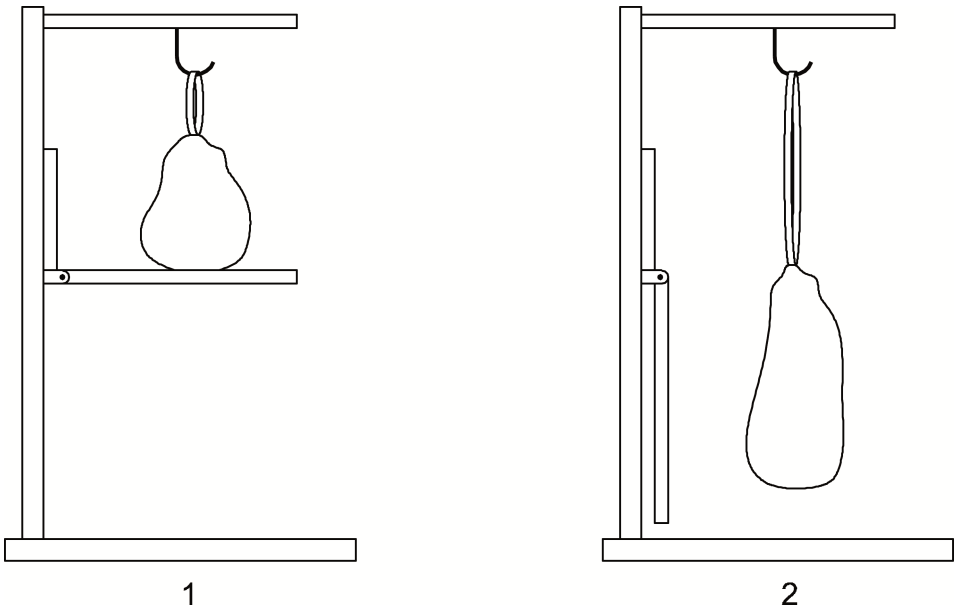
— break of one handle.

For each sack submitted to testing, the test report shall mention either:

— successful test;

or

— a description of the failure.

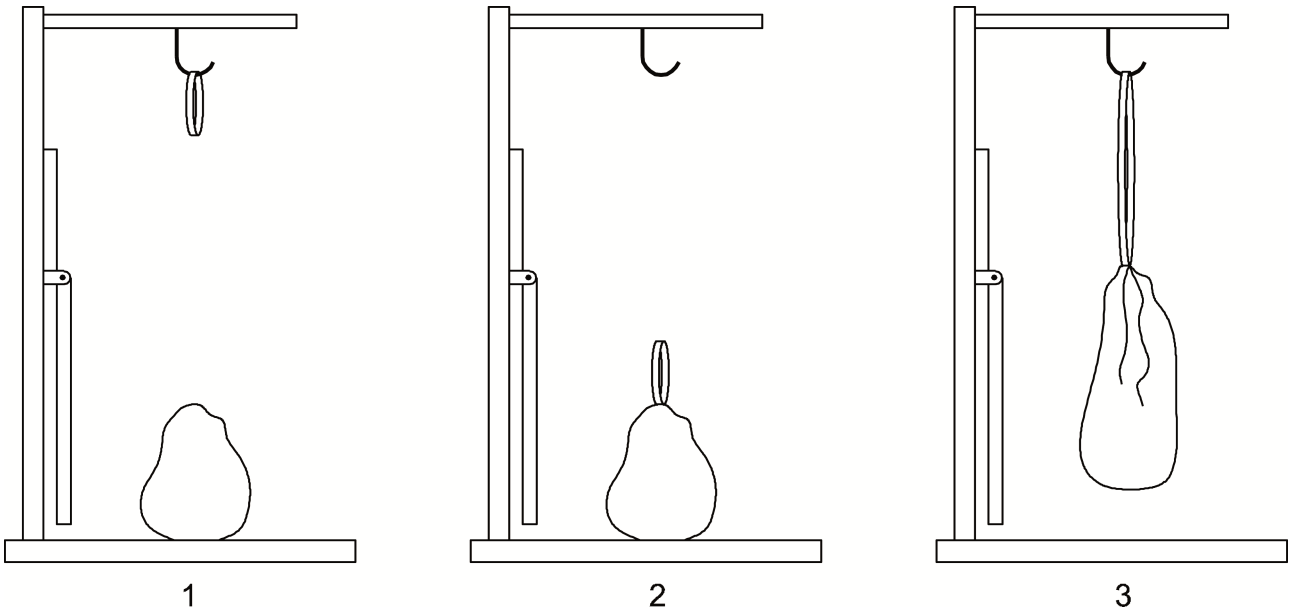


Key

1 Before testing – handles tight without stretching

2 After testing for a successful test - no breaking of the tie and the retaining seam.

Figure 3 — Resistance of the closing system - Successful test



Key

1 Breaking of the seam retaining the tie

2 Breaking of the tie

3 Breaking of one handle

Figure 4 — Resistance of the closing system – Failures

7.3 Marking

The following information shall be printed on each sack or on the packaging:

a) a reference to this European Standard: i.e. EN 13592;

b) the dimensions of the sack, i.e. the useful width, useful length and the nominal thickness;

c) identification of the manufacturer or its representative (customer, distributor, etc.).

d) applicable test loads (one load or two different loads) for sacks for selective waste collection, if different from this standard, written in the following way:

EXAMPLE 1: for standard sacks:

"SWC xxKG" where "xxKG" refers to the drop test.

EXAMPLE 2 for drawtight sacks:

"SWC xxKG/yyKG" where "xxKG" refers to the drop test load and "yyKG" refers to the drawtight closing system test.

Information shall all be printed in the same font.

Different information may be reported by an agreement between the supplier and the customer (e.g. value for opacity)

EXAMPLE 3 EN 13592 — 500/700 - 35 µm – AnyCo Ltd

Produced for ….

EXAMPLE 4 EN 13592 — SWC 4KG/4KG – 600/800 – 30 µm – AnyCo Ltd

8 Sacks for the separate collection of biodegradable waste for organic recycling

8.1 Requirements

8.1.1 Biodegradability and compostability of the sacks

Sacks for the separate collection of biodegradable waste for organic recycling shall comply with the requirements of EN 13432.

8.1.2 Sampling

The number of sacks for each test is specified in Table B.2.

8.1.3 Useful width and useful length

The minimum useful width, measured on the sack, shall not be less than the minimum value:

P-2,5 % or *P*-10 mm

The minimum useful length, measured on the sack, shall not be less than the minimum value:

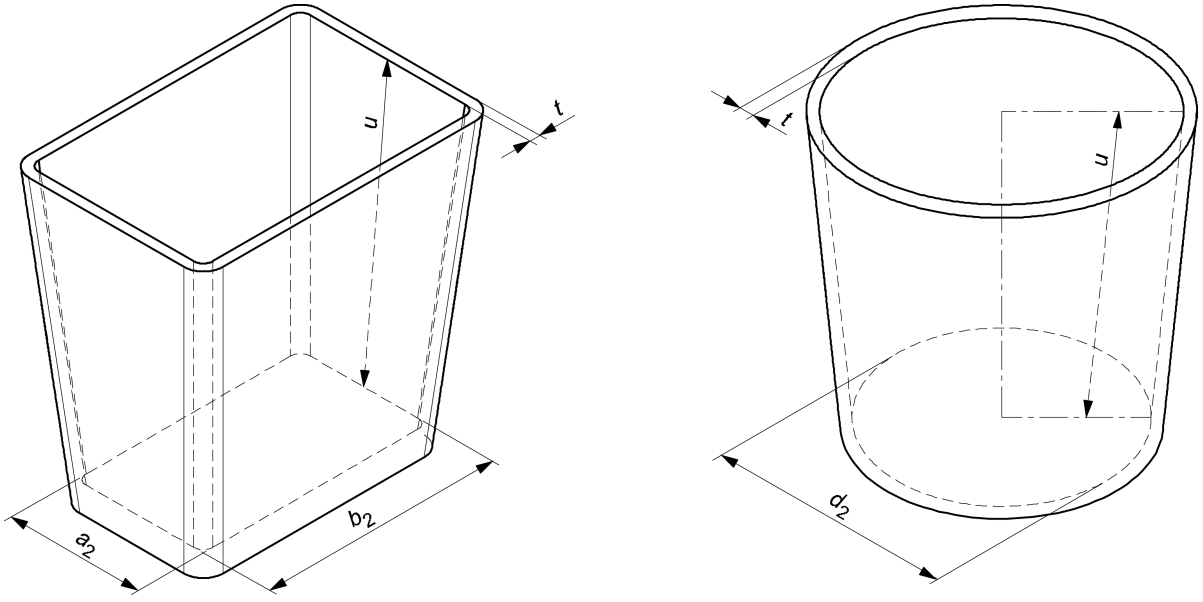
L- 2,5 % or *L*-10 mm

No defective sacks shall be permitted out of 10 sacks when tested according to 7.2.2.2 and 7.2.2.3.

8.1.4 Dimensions of sacks for bins with a volume up to 25 l

The dimensions of typical bins with a volume up to 25 l are shown in Figure 5.

If not specified in an agreement between supplier and customer, the following shall apply.



Type 1 **Type 2**

Key

	Type 1: bin of rectangular section		**Type 2: bin of circular section**
a_2	internal dimension of one side of the rectangular bottom of the bin	d_2	internal diameter of the bin at its bottom
b_2	internal dimension of the other side of the rectangular bottom of the bin	u	internal upright side of the bin
u	internal upright side of the bin	t	thickness of the bin rim
t	thickness of the bin rim		

Figure 5 — Dimensions of bins used for example

The dimensions of a sack suitable for bins up to 25 l, shall comply with the following criteria:

$$P \geq 0{,}97 \cdot \left(\frac{p_t}{2} \right)$$

Where

p_t is the external perimeter of the rim of the bin, expressed in millimetres measured with a measuring tape

a) For bins of Type 1:

$$L = 60 + u + t + \frac{Minimum\_value\_(a_2, b_2)}{2}$$

where

$a2$ is the internal dimension of one side of the rectangular bottom of the bin, expressed in millimetres;

$b2$ is the internal dimension of the other side of the rectangular bottom of the bin, expressed in millimetres;

u internal upright side of the bin expressed in millimetres;

t is the thickness of the bin rim, expressed in millimetres.

b) For bins of Type 2:

$$L = 60 + u + t + \frac{d_2}{2}$$

where

$d2$ is the internal diameter of the bin at its bottom, expressed in millimetres;

u internal upright side of the bin expressed in millimetres;

t is the thickness of the bin rim, expressed in millimetres.

c) For bins with a section different from this of Type 1 or Type 2:

$$P \geq 0{,}97 \cdot \left(\frac{p_t}{2} \right)$$

$$L \geq 1{,}5u$$

where

p_t is the external perimeter of the rim of the bin, expressed in millimetres measured with a measuring tape

u internal upright side of the bin expressed in millimetres

8.1.5 Film thickness

8.1.5.1 General

Each sack shall satisfy the requirements for the individual values specified in 8.1.5.2 and for the average values specified in 8.1.5.3, when tested according to 7.2.3.2 (thickness measuring device method).

8.1.5.2 Individual values

No individual value of the film thickness measured in micrometres (μm) shall be:

$< N_t - 0{,}25\ N_t$

rounded to the nearest upper or lower unit, in micrometres (μm) (e.g. 1,4 as 1 μm; 1,5 as 2 μm; 1,6 as 2 μm)

8.1.5.3 Average value

The arithmetic average value of the film thickness calculated for 10 samples measurements shall be:

$> N_t - 0{,}05\ N_t$

8.1.5.4 Film material for which the density is known

If the density of the film material is known, the average thickness can be alternatively determined according to ISO 4591:1992, Clause 3, or referring to 7.2.3.3 (gravimetric method).

The arithmetic average value of the thickness shall be:

$> N_t - 0{,}05\ N_t$

Keep the remaining parts of these sacks for the measurement of the opacity (see 8.1.6).

8.1.6 Opacity

If and only if required by an agreement between the supplier and the customer, the opacity of the sacks shall be determined in accordance with 7.2.4.1 or 7.2.4.2.

No defective sack shall be permitted out of 10 sacks (or strips) for individual values of each sack (or strip) and the average value of the 10 measurements when tested according to 7.2.4.1.

When determined according to 7.2.4.2, the opacity of the sacks shall satisfy the criteria given 7.2.4.2.

8.1.7 Resistance to leakage

No defective sack shall be permitted out of 10 sacks when tested according to 7.2.5.

The durability of biodegradable and compostable sacks is depending on the collection frequency, environmental conditions and the nature of the organic waste. This European Standard provides a minimum requirement for the resistance to leakage. Other specific test methods may be applied if needed on the basis of an agreement between the supplier and customer [1] [2].

8.1.8 Drop impact resistance

No more than three defective sacks shall be permitted out of 30 sacks when tested according to 8.2.2.

8.1.9 Resistance of the closing device

8.1.9.1 Tensile strength of ties

For sacks provided with an integrated or added tie, the tensile strength of the tie when measured according to 7.2.7.1 shall not be less than 40 N.

No more than one failure out of the 10 ties tested is permitted.

When the tie is not integrated with the sack, the number of ties shall not be less than the number of sacks.

8.1.9.2 Resistance of the closing device of drawtight sacks

No more than two defective sacks out of 10 sacks shall be permitted when tested according to 8.2.3.

8.1.10 Tensile properties of films

If specified in an agreement between the supplier and the customer, the tensile properties of the film shall be determined.

If required, the mechanical properties shall be determined according to 8.2.3.

The tensile properties and thickness of typical films, suitable for example for caddy liners, are given, as informative, in Annex D.

8.2 Test methods

8.2.1 Atmosphere for conditioning and testing

Unless otherwise specified, the specimens shall be conditioned and tested in the standard atmosphere 23/50 according to EN ISO 291, [(23 ± 5) °C, (50 ± 10) HR (relative humidity)]. The test temperature shall be recorded.

8.2.2 Drop impact resistance

8.2.2.1 Principle

The test is intended to determine the overall suitability of the sack when it is filled to its maximum useful capacity.

Sacks, loaded with specified test loads according to the dimensions of the sacks, are dropped from a height of (1,20 ± 0,01) m on a flat and smooth surface. Then the sacks are inspected.

8.2.2.2 Apparatus

8.2.2.2.1 Drop testing machine

The drop test machine shall be as specified in EN 22248 and EN ISO 7965-2.

8.2.2.2.2 Test load (ballast)

The test load (ballast) consisting of a specified number of cotton or jute bags, filled with PE-LD granules for a total mass of ($250\ ^{+10}_{0}$) g each.

The cotton or jute bags shall be closed by stitching them across their entire width, at least 40 mm from their opening.

Dimensions of the bags up to the stitching are: (140 ± 10) mm x (180 ± 10) mm.

The number of bags and test loads according to the dimensions of the sacks are given in Table 4.

When *P* and *L* are not in the same row in Table 4, the test load to be applied shall be the mean value of the test loads required for the corresponding *P* and *L*.

EXAMPLE For a sack with *P* = 500 mm and *L* = 650 mm, test load = 4 500 g ((3000 + 6000)/2).

Table 4 — Test loads for drop test of biodegradable/compostable sacks

Useful width *P* mm	Useful Length *L* mm	Number of ballast bags	Test load g
$P \leq 400$	$L \leq 400$	6	1 500
$400 < P \leq 440$	$400 < L \leq 440$	8	2 000
$440 < P \leq 520$	$440 < L \leq 600$	12	3 000
$520 < P \leq 600$	$600 < L \leq 800$	24	6 000
$P > 600$	$L > 800$	32	8 000

8.2.2.2.3 Gauges

10 mm diameter gauge for checking the sacks after impact when $P \leq 520$ mm.

20 mm diameter gauge for checking the sacks after impact when $P > 520$ mm.

8.2.2.3 Procedure

Fill the sack with the test bags, in conformance with Table 4. Then gently deflate the sack before closing.

Close the sack with an appropriate closing system. It shall be closed at approximately 100 mm from the opening of the sack when the closing system is not part of the bag itself or 50 mm from the opening for sacks with useful width, *P*, less or equal to 520 mm.

For standard sacks carefully remove the ties, if any, from the bottom of the sacks.

For other sacks their own closing system shall be used.

Place the sack with the load on the trap of the testing machine (8.2.2.2.1) in such a position that the bottom of the sack is (1,20 ± 0,01) m over the test surface.

Drop the sack once on its bottom.

Inspect the sack for tears or ruptures before removing the bags from the sack. Determine whether or not the tears allow the passage of a 10 mm or 20 mm diameter gauge (see 8.2.2.2.3).

Repeat the procedure for each sack.

For each sack submitted to testing, the test report shall mention either:

— no tear;

or

— the diameter of the gauge used for testing tears and the result, as “Pass” or “Fail”. A failure being recorded when the relevant gauge passes through the tear.

8.2.3 Resistance of the closing system of drawtight sacks

8.2.3.1 Principle

The test is intended to verify that the strength of the closing system when the sack, filled to its specified test load, is picked up.

Sacks loaded with specified test loads according to the dimensions of the sacks are submitted to a severe retained hanging.

8.2.3.2 Apparatus

Hanging hook, rigidly fixed as shown in Figure 2, and drop testing machine as specified in EN 22248 and EN ISO 7965-2.

8.2.3.3 Test load (ballast)

Test loads consisting of bags as defined in 8.2.2.2.2 shall be used.

The number of bags and test loads according to the dimensions of the sacks are given in Table 5.

When P and L are not in the same row in Table 5, the test load to be applied shall be the mean value of test loads required for the corresponding P and L.

EXAMPLE For a sack with P = 500 mm and L = 650 mm, test load = 4 500 g ((3 000 + 6 000)/2).

Table 5 — Test loads for resistance of the closing system

Useful width P mm	Useful Length L mm	Number of ballast bags	Test load g
$P \leq 400$	$L \leq 400$	6	1 500
$400 < P \leq 440$	$400 < L \leq 440$	8	2 000
$440 < P \leq 520$	$440 < L \leq 600$	12	3 000
$520 < P \leq 600$	$600 < L \leq 800$	24	6 000
$P > 600$	$L > 800$	32	8 000

8.2.4 Tensile properties

The tensile properties shall be determined according to EN ISO 527-1 and EN ISO 527-3 on test specimens cut from the sacks in the longitudinal and transverse directions, in parts which are free from folds or welds.

From each sack, at least five test specimens are cut in each direction.

8.3 Marking

The following information shall be printed on each sack or on the packaging:

a) a reference to this European Standard: i.e. EN 13592;

b) a reference to EN 13432;

c) the dimensions of the sack, i.e. useful width and useful length, nominal thickness;

d) identification of the manufacturer or its representative (customer, distributor, etc).

e) information of the manufacturer: for providing traceability, the following details shall be given:

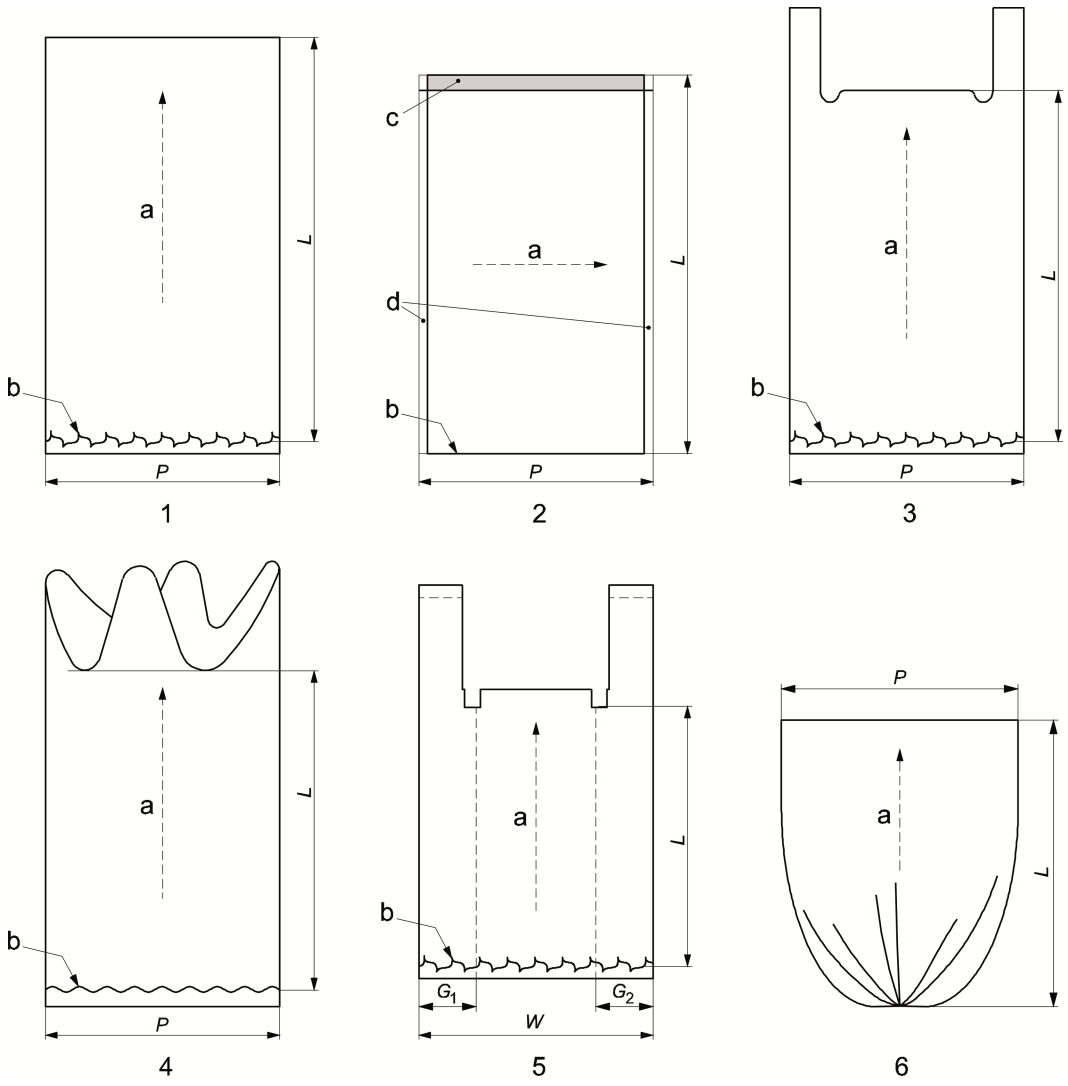
   1) the production period, year and month, in figures or in code;

   2) a name or code for the production site if the manufacturer is producing the same product at different sites.

   EXAMPLE EN 13592 — EN 13432- 500/700 Manufacturer/customer/distributor (month or week/year) XX or ZZ/2015

Other information may be reported by an agreement between the supplier and the customer.

Annex A
(informative)
Types of sacks



Key

1	standard sack	a	direction of extrusion
2	drawtight sack	b	bottom of sack
3	strap sack	c	drawtight
4	four flap sack	d	edge seams
5	T-shirt bag	G1	gusset fold
6	star sealed sack	G2	gusset fold
		L	useful length
		P	useful width
		W	width without the gussets folds

For T-shirt bag: *P* = W+G1+G2

Figure A.1 — Types of sacks

Annex B
(normative)

Sampling

B.1 Sampling for sacks for the collection of household waste, except for the separate collection of biodegradable waste for organic recycling

B.1.1 Primary sampling

Take at least 100 sacks at random from a minimum of five sets, rolls or packets.

B.1.2 Final sampling

Final sampling of 55 sacks for drawtight sacks or 45 sacks for non drawtight sacks (plus 5 sacks if gravimetric method is requested) shall be taken at random from primary sampling.

Final sampling shall be divided randomly in five groups referred to as: Group I, Group II, Group III, Group IV and Group V, as specified in Table B.1.

Table B.1 — Final sampling

Group	Test to be performed	Subclause	Number of sacks to be tested
I	Dimensions measurement of:		10
	— useful length	7.2.2	
	— useful width	7.2.2	
	— thickness by thickness measuring device methods	7.2.3	
	opacity	7.2.4	
	Tensile strength of ties (if applicable)	7.2.7.1	
II	Resistance to leakage	7.2.5	5
III	Drop impact resistance	7.2.6	30
IV	Determination of the resistance of the closing system for drawtight sacks and any other integrated hanging system	7.2.7.2	10
V	Determination of thickness by gravimetric method [a]	7.2.3.3	5
[a] Sampling of five sacks from five rolls or five bundles.			

B.2 Sampling for sacks for the separate collection of biodegradable waste for organic recycling

B.2.1 Primary sampling

Take at least 100 sacks at random from a minimum of five sets, rolls or packets.

B.2.2 Final sampling

Final sampling of 60 sacks for drawtight sacks or 50 sacks for non drawtight sacks (plus five sacks if gravimetric method is requested) shall be taken at random from primary sampling.

Final sampling shall be divided randomly in five groups referred to as: Group I, Group II, Group III, Group IV and Group V, as specified in Table B.2.

Table B.2 — Final sampling

Group	Test to be performed	Subclause	Number of sacks to be tested
I	Dimensions measurement of: — useful length — useful width — thickness by thickness measuring device methods Opacity Tensile strength of ties (if applicable)	 7.2.2 7.2.2 7.2.3 7.2.4 7.2.7.1	10
II	Resistance to leakage	7.2.5	10
III	Drop impact resistance	8.2.2.	30
IV	Determination of the resistance of the closing system for drawtight sacks and any other integrated hanging system	8.2.3.3	10
V	Determination of thickness: - by gravimetric method [a] - in accordance with ISO 4591	7.2.3.3 Clause 3	5 3 or 5 or 10
[a] Sampling of five sacks from five rolls or five bundles			

Annex C
(informative)

Template for reporting test results

C.1 Template for sacks for the collection of household waste, except for the separate collection of biodegradable waste for organic recycling

Waste sack identification		
Supplier name and contact details		
Use (4a)		
Type of sack (4c)		
Colour (4d)		
Non-biodegradable plastic identification code (4d) According to EN ISO 1043-1		
Test results		
Dimensions		
Agreed dimensions (5)	*P* / *L* mm	
Useful length (*P*), no. defective sacks (7.2.2.2)	/ 10	
Useful width (*L*), no. defective sacks (7.2.2.3)	/ 10	
Useful length x useful width (7.1.2)	*P* / *L* mm	Conform / Non-conform
Thickness		
Nominal thickness	µm	
Measured individual values (7.2.3.2)	µm	Pass / Fail
Average value by gravimetric method (7.2.3.3), if required	µm	Pass / Fail
Individual values (7.1.3.2)		Conform / Non-conform
Average measured thickness (7.1.3.3)	Average µm	
Opacity		
Required individual, average, opacity (7.1.4.1),	%, %	
Individual values (7.2.4.1)	%	
Individual values, no. defective sacks (7.1.4.2)	/ 10	Pass / Fail
Average value (7.1.4.3)	%	Conform / Non-conform

Resistance to leakage		
Load (Volume) tested, (7.2.5.1.3)	l	
Drops recorded in water test (7.2.5.2)		
Drops recorded in wet mixture test (7.2.5.2), if applicable	/ 5	
No. defective sacks		Pass / fail
Resistance to leakage (7.1.5)		Conform / Non-conform
Drop Impact Resistance		
Test load (ballast) (7.1.6.2, 7.2.6.2.2)	g	
Individual test results (for each sack submitted) - No tear / Pass or fail		
No. defective sacks / total number sacks tested		Pass/ fail
Drop Impact resistance (7.1.6)		Conform / Non-conform
Resistance of the closing device		
<u>Sacks with integrated or added ties</u> Individual results		
No. failures	/ 10	Pass / Fail
Resistance of closing device (integrated or added tie) (7.1.7.1)		Conform / Non-conform
<u>Drawtight sacks</u>		
Test load (ballast) 7.2.7.2.3	g	
Individual test results (successful or description of the failure) 7.2.7.2.5		
No. defective sacks	/ 10	Pass / Fail
Resistance of the closing system of drawtight sacks (7.1.7.2)		Conform / Non-conform
Overall Conformity to EN 13592		
Note Report the testing temperature for each test, if relevant information		

C.2 Template for sacks for the separate collection of biodegradable waste for organic recycling

Waste sack identification		
Supplier name and contact details		
Use (4a)		
Type of sack (4c)		
Colour (4d)		
Biodegradable and compostable plastic sacks (4g) According to EN 13432 (8.1.1)		
Test Results		
Dimensions		
Agreed dimensions (5)	*P* / *L* mm	
Useful length (*P*), no. defective sacks (7.2.2.2)	/ 10	
Useful width (*L*), no. defective sacks (7.2.2.3)	/ 10	
Useful length x useful width (8.1.3)	*P* / *L* mm	Conform/Non-conform
Thickness		
Nominal Thickness	µm	
Measured individual values (7.2.3.2)	µm	Pass/Fail
Average value by gravimetric method (7.2.3.3) or in accordance with ISO 4591, if required	µm	Pass/Fail
Individual values (8.1.5.2)	µm	Conform/Non-conform
Average measured thickness (8.1.5.3)	µm	Conform/Non-conform
Opacity (only if required)		
Required individual, average, opacity (7.1.4.1), Individual values (7.2.4.1)	%, % %	
Individual values, no. defective sacks (7.1.4.2) Average value (7.1.4.3)	/ 10 %	Pass/Fail Conform/Non-conform
Resistance to leakage		
Load (Volume) tested, (7.2.5.1.3) Drops recorded in water test (7.2.5.2) Drops recorded in wet mixture test (7.2.5.2), if applicable	l	
No. defective sacks Resistance to leakage (7.1.5)	/ 10	Pass/Fail Conform/Non-conform

Drop Impact Resistance Test load (ballast) (8.2.2.2.2) Individual test results (for each sack submitted) - No tear / Pass or fail (including gauge diameter) No. defective sacks Drop Impact resistance (8.1.8)	 g / 30	 Pass/Fail Conform/Non-conform
Resistance of the closing device <u>Sacks with integrated or added ties</u> Individual results No. failures Resistance of closing device (integrated or added tie) (8.1.9.1) <u>Drawtight sacks</u> Test load (ballast) 8.2.3.3 Individual test results (successful or description of the failure) 7.2.7.2.5 No. defective sacks Resistance of the closing system of drawtight sack (8.1.9.2)	 / 10 g / 10	 Pass/Fail Conform/Non-conform Pass / Fail Conform/Non-conform
Tensile Properties (8.2.4) Stress at break longitudinal direction MPa Stress at break transversal direction MPa Strain at break longitudinal direction % Strain at break transversal direction %	 MPa MPa % %	
Overall Conformity to EN 13592		
Note Report the testing temperature for each test, if relevant information		

Annex D
(informative)

Typical characteristics of biodegradable/compostable films for caddy liners

Table D.1 gives, as example only, the characteristics for a caddy liner, suitable for capacity 7 l caddies. These values are considered as typical at the date of publication of this standard and do not establish any requirement.

Determine the tensile characteristics in accordance with EN ISO 527-1 and EN ISO 527-3 on five test pieces.

For reproducible test results we recommend to use test pieces type 2, 10 mm wide, cut in each direction of the film, MD and TD, at a testing speed of 50 mm/min.

Calculate the arithmetic average value of the five measurements.

Table D.1 — Typical characteristics for caddy liners suitable for capacity 7 l caddies

Characteristic	Unit	Reference values	Test method
Stress at break longitudinal direction	MPa	≥ 16	EN ISO 527-1 EN ISO 527-3
Stress at break transversal direction	MPa	≥ 16	
Strain at break longitudinal direction	%	≥ 150	
Strain at break transversal direction	%	≥ 300	
Thickness	µm	15	ISO 4591

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[1] NF 082[1], *Certification rules NF Mark – Plastic waste sacks*

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