
Žito in žitni proizvodi - Določanje nečistoč v pšenici (*Triticum aestivum* L.), pšenici durum (*Triticum durum* Desf.), rži (*Secale cereale* L.) in krmilnem ječmenu (*Hordeum vulgare* L.)

Cereals and cereal products - Determination of Besatz in wheat (*Triticum aestivum* L.), durum wheat (*Triticum durum* Desf.), rye (*Secale cereale* L.) and feed barley (*Hordeum vulgare* L.)

Getreide und Getreideerzeugnisse - Bestimmung von Besatz in Weizen (*Triticum aestivum* L.), Hartweizen (*Triticum durum* Desf.), Roggen (*Secale cereale* L.) und Futtergerste (*Hordeum vulgare* L.)

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Céréales et produits céréaliers - Détermination du pourcentage d'impuretés dans le blé tendre (*Triticum aestivum* L.), le blé dur (*Triticum durum* Desf.), le seigle (*Secale cereale* L.) et l'orge fourragère (*Hordeum vulgare* L.)

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**Cereals and cereal products - Determination of Besatz in wheat
(Triticum aestivum L.), durum wheat (Triticum durum Desf.), rye
(Secale cereale L.) and feed barley (Hordeum vulgare L.)**

Céréales et produits céréaliers - Détermination du
pourcentage d'impuretés dans le blé tendre (Triticum
aestivum L.), le blé dur (Triticum durum Desf.), le seigle
(Secale cereale L.) et l'orge fourragère (Hordeum vulgare L.)

Getreide und Getreideerzeugnisse - Bestimmung von Besatz
in Weizen (Triticum aestivum L.), Hartweizen (Triticum
durum Desf.), Roggen (Secale cereale L.) und Futtergerste
(Hordeum vulgare L.)

This European Standard was approved by CEN on 21 June 2008 and includes Corrigendum 1 issued by CEN on 14 January 2009 and Amendment 1 approved by CEN on 24 August 2013.

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Foreword

This document (EN 15587:2008+A1:2013) has been prepared by Technical Committee CEN/TC 338 “Cereals and cereal products”, 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of an identical text or by endorsement, at the latest by April 2014, and conflicting national standards shall be withdrawn at the latest by April 2014.

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This document supersedes EN 15587:2008.

This document includes Corrigendum 1 issued by CEN on 2009-01-14 and Amendment 1 approved by CEN on 2013-08-24.

The start and finish of text introduced or altered by amendment is indicated in the text by tags **A1** **A1**.

The modifications of the related CEN Corrigendum have been implemented at the appropriate places in the text and are indicated by the tags **A1** **A1**.

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EN 15587:2008+A1:2013 (E)

1 Scope

This European Standard specifies the term *Besatz* (impurities) and describes methods for the determination of its components. The term *Besatz* is used as a parameter for certain quality aspects in common wheat (*Triticum aestivum* L.), durum wheat (*Triticum durum* Desf.), rye (*Secale cereale* L.) and feed barley (*Hordeum vulgare* L.).

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 6644, *Flowing cereals and milled cereal products — Automatic sampling by mechanical means* (ISO 6644:2002)

EN ISO 13690, *Cereals, pulses and milled products — Sampling of static batches* (ISO 13690:1999)

prEN ISO 24333, *Cereals and cereal products — Sampling* (ISO/DIS 24333:2006)

ISO 5223, *Test sieves for cereals*

3 Terms and definitions

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

3.1

Besatz

all matter of a sample of grain other than the basic cereal of unimpaired quality

NOTE 1 It comprises the four fractions: broken grains, grain impurities, sprouted grains and miscellaneous impurities.

NOTE 2 Live pests are not considered as *Besatz*. They are specified as a separate criterion.

NOTE 3 A schematic summary on *Besatz* is given in Annex A.

NOTE 4 Pictures of examples are given in [9].

3.2

broken grains

all grains belonging to the basic cereal not damaged by pests and whose endosperm is partially uncovered, including grains damaged by threshing and grains from which the germ has been removed

[A₁] 3.3

grain impurities

fraction consisting of shrivelled grains, other cereals, grains damaged by pests, grains in which the germ is discoloured (only for common and durum wheat), mottled grains (only for durum wheat) and grains overheated during drying

Note 1 to entry: For common wheat, grains in which the germ is discoloured are disregarded up to 8 %. **[A₁]**

3.3.1**shrivelled grains**

grains which after elimination of all other matter defined in this European standard pass through 20 mm slotted sieves with widths of the following dimensions:

— common wheat	2,0 mm
— durum wheat	1,9 mm
— rye	1,8 mm
— feed barley	2,2 mm
— feed barley with moisture content below 12,5%	2,0 mm

and grains damaged by frost and unripe grains (green)

NOTE Frost damaged kernels can show the following appearance: black or brown discoloration, bleached or blistered, distinctly wax-like or candied surface. Frequently they have dark stripes showing through the sides of the kernel.

A1 3.3.2**other cereals**

all cereals grains, whatever their state, not belonging to the considered species

Note 1 to entry: In a durum wheat sample, all common wheat grains and their grain dockage components are classified as other cereals and vice versa.

3.3.3**grains damaged by pests**

grains which show visible damage due to attack by insects, rodents, mites or other pests

Note 1 to entry: Grains attacked by wheat midge are considered unsound grains (3.5.2) only when more than half the surface of the back of the grain is coloured grey to black as a result of secondary cryptogamic attack. Where discoloration covers less than half the surface of the back of the grain, they are classed as grains damaged by pests.

3.3.4**grains with discoloured germ, mottled grains**

grains either

- a) with discoloured germ in which the tegument covering the germ is coloured brown to brownish black and in which the germ is normal and not sprouted;

Note 1 to entry: If the germ is coloured only with one little spot, the grain is considered sound.

Note 2 to entry: This fraction only exists for common wheat and durum wheat.

Note 3 to entry: For common wheat these grains are disregarded up to 8 %.

or

- b) mottled which show a brown to brownish black discoloration elsewhere than on the germ itself, particularly in the crease

Note 4 to entry: If the coloration is only in the crease, grains are considered mottled only if the spot covers more than 1/4 of the length of the crease.

Note 5 to entry: This fraction only exists for durum wheat. **A1**

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3.3.5

grains overheated during drying

grains showing external signs of scorching but of which the kernels are sound

NOTE Grains showing external signs of scorching and of which the kernels are coloured yellowish-grey to brownish-black are considered unsound.

3.4

sprouted grains

grains in which the radicle or plumule is clearly visible to the naked eye

NOTE 1 Account should be taken of the general appearance of the sample when its content of sprouted grains is assessed.

NOTE 2 In some cereal classes the germ is protuberant, e.g. in durum wheat, and the germ tegument splits when the batch of cereals is shaken. These grains resemble sprouted grains but must not be included in that group. Sprouted grains are only those where the germ has undergone clearly visible changes which make it easy to distinguish the sprouted grain from the normal grain.

[A1] 3.5

miscellaneous impurities**(synonymous: Schwarzbeseatz)**

fraction consisting of extraneous seeds, unsound grains, extraneous matter, husks, ergot, bunted grains and impurities of animal origin [A1]

3.5.1

extraneous seeds

seeds of plants, whether or not cultivated, other than cereals

NOTE 1 They comprise noxious and not noxious seeds. Noxious seeds means seeds which are toxic to humans and animals. This group also includes seeds hampering or complicating the cleaning and milling of cereals and seeds affecting the quality of products processed from cereals.

NOTE 2 In some cases it may be necessary to distinguish between noxious seeds and not noxious seeds. An indicative list of noxious seeds is given in Annex A of ISO 7970:2000 [4].

[A1] 3.5.2

unsound grains

grains of the species or another cereal rendered unfit for human consumption and, regarding feed grain, for feed consumption, owing to putrefaction, mildew, grains affected with fungi (such as fusarium), bacterial or other causes

Note 1 to entry: Unsound grains also include grains damaged by spontaneous heat generation or too extreme heating during drying which are fully grown grains in which the tegument is coloured greyish-brown to black while the cross-section of the kernel is coloured-yellowish grey to brownish-black.

Note 2 to entry: Grains attacked by wheat midge are considered unsound grains only when more than half the surface of the back of the grain is coloured grey to black as a result of secondary cryptogamic attack. Where discoloration covers less than half the surface of the back of the grain, they need to be classed with grains damaged by pests.

Note 3 to entry: Grains affected with fusariosis are grains whose pericarp is contaminated with *Fusarium* mycelium; such grains look often slightly shrivelled, wrinkled and have pink or white diffuse patches with an ill-defined outline. Grains affected by fusariosis are the major source of mycotoxins.

3.5.3**extraneous matter**

all matter in a sample of cereals retained by a sieve with apertures of 3,55 mm and passing through a sieve with apertures of 1,0 mm, and stones, sand, fragments of straw and similar impurities in the sample which pass through a sieve with apertures of 3,55 mm and are retained by a sieve with apertures of 1,0 mm

Note 1 to entry: Other cereals and particularly large grains of the basic cereal and ergot which are retained by a sieve with apertures of 3,55 mm are not extraneous matter. ^(A1)

3.5.4**husks**

glumes and grain husks

3.5.5**ergot**

sclerotia of *Claviceps purpurea*

3.5.6**bunted grains**

grains filled with a fetid-smelling dust comprising the spores of smuts (*Ustilago* spp.) or brown-black spores of bunt (*Tilletia* spp.)

3.5.7**impurities of animal origin**

impurities originating from animals such as feathers, hairs, excrements, dead insects and fragment of insects

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4 Principle

The principle of this method is to separate all the groups of *Besatz*, defined under 3.1, from the normal basic grains by sieving and manual selection.

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5 Apparatus**5.1 Sample divider****5.2 Balance**, capable to weighing to the nearest 0,01 g

5.3 Sieves machine fitted with a cover and a receiver, the slot-widths 3,5 mm × 20,0 mm, 2,2 mm × 20,0 mm, 2,0 mm × 20,0 mm, 1,9 mm × 20,0 mm, 1,8 mm × 20,0 mm, 1,0 mm × 20,0 mm, in accordance with the specification of ISO 5223

5.4 Sieving machine allowing a forceful horizontal backward and forward movement of the sieves, e.g. vibrator base with mounted sieves, or a shaking sieve

5.5 Magnifying glass, illuminated**5.6 Forceps** or **horn spatula****5.7 Pots**, for retaining components

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6 Sampling

It is important the laboratory receive a sample which is truly representative and has not been damaged or changed during transport and storage.

Sampling is not part of the method specified in this International Standard. Recommended sampling methods are given in EN ISO 6644, EN ISO 13690 and prEN ISO 24333.

7 Procedure (see diagram in Annex B)

Prepare by division a representative sample of around 250 g (a) and weigh it to the nearest 0,1 g.

This sample is sieved on a sieve column (one above with an aperture of 3,5 mm and the second under with an aperture of 1,0 mm) for 30 s either with a sieving machine (5.4), or by hand. If sieving is performed by hand, it must consist of horizontal movements parallel to the length of the slots (around one backward and forward movement per second).

The matter retained by the sieve with slotted perforations of 3,5 mm (5.3) and that passed through the sieves with slotted perforations of 1,0 mm (5.3), except other cereals and particularly large grains of the basic cereal and ergot, shall be weighed together and regarded as extraneous matter. Stones, mud balls, straws, chaff and similar impurities from the overtails of the 1,0 mm slotted sieve (5.3) have to be picked out. Both fractions are weighted and are regarded as extraneous matter (3.5.3).

Impurities of animal origin should be counted, including those which passed through the sieve of 1,0 mm slot-width (5.3). If necessary, a magnifying glass (5.5) should be used.

NOTE The count should be quoted separately in numbers per kg of common wheat, durum wheat, rye or feed barley as appropriate.

Remove ergot from the overtails of the 1,0 mm slotted sieve (5.3) and weigh to 0,01 g accurately.

The fraction retained is divided with the sample divider (5.1) to obtain a sub sample (c) between 50 g and 100 g. Weigh it to the nearest 0,1 g.

This partial sample is spread out on a table and fractions defined in Clause 3 are extracted by means of forceps or a horn spatula (5.6).

In case multiple kinds of damages are observed, the damaged grain shall be added to the fraction with the highest importance for the overall quality.

In rye samples with respect of natural variability of the colour of rye grains, grains with discoloured germ or mottled grains (3.3.4) are not picked out.

If the partial sample contains unthreshed grains of the basic cereals, remove the grains from the glumes by hand and add them to the fraction husks (3.5.4).

This sub sample without all the impurities is sieved for 30 s on a sieve (5.3) with an aperture of 2,0 mm for common wheat, 1,9 mm for durum wheat, 1,8 mm for rye, 2,2 mm for barley (2,0 mm if moisture content of barley is less than 12,5 %). All elements passing through are considered as shrivelled grains.

Weigh the Besatz-free overtails of the 1,0 mm sieve (d) and all the groups of Besatz to the nearest 0,01 g. If, for a partial sample, the sum of broken grains (3.2), shrivelled grains (3.3.1), other cereals (3.3.2), grains damaged by pests (3.3.3), grains in which the germ is discoloured (3.3.4) grains overheated during drying (3.3.5), sprouted grains (3.4), extraneous seeds (3.5.1), unsound grains (3.5.2), husks (3.5.4), bunted grains (3.5.6) and the weight of the Besatz-free overtails of the 1,0 mm sieve (d) differs by more than 0,5 % from the sub sample weight (c), the determination is not valid and a new partial sample must be analysed.

8 Expression of results

Express the content of extraneous matter (3.5.3) and the content of ergot (3.5.5) by using the formula given below as mass fraction in percent of the grains as received:

$$Bx = \frac{x \times 100}{a} \quad (1)$$

where

Bx is the % Besatz fraction;

a is the weight of average sample;

x is the weight of the Besatz group concerned.

Express the content of each fraction of Besatz (3.2 to 3.5.6 without 3.5.3 and 3.5.5) by using the formula given below as mass fraction in percent of the grains as received:

$$Bx = x \times \frac{a - b}{a \times s} \times 100 \quad (2)$$

where

Bx is the % Besatz fraction;

x is the weight of the Besatz group concerned;

a is the weight of the average sample;

b is the weight of the extraneous matter (3.5.3) and ergot (3.5.5);

s is the total weight of (d) and of 3.2 to 3.5.6, without 3.5.3 and 3.5.5.

The calculation should be carried out to the nearest 0,01 %.

The percentages of grain impurities (3.3) and of Miscellaneous impurities (3.5) are calculated in summing the percentages of sub fractions constituting the fraction.

The percentage of Besatz (3.1) is calculated in summing the percentages of sub fractions broken grains (3.2), grain impurities (3.3), sprouted grains (3.4) and Miscellaneous impurities (3.5).

In the investigation report, quote to a precision of 0,1 %, with the exception of the extraneous seeds (3.5.1) and ergot (3.5.5), which shall be quoted to an accuracy of 0,01 %.

Report the impurities of animal origin (3.5.7) in numbers per kg of grain. If necessary specify the kind of impurity.

An example of calculation is given in Annex C.