# AFRICAN STANDARD

# DARS 878

Second Edition 2023



## Barley grains — Specification

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ARSO Central Secretariat
International House 3rd Floor
P. O. Box 57363 — 00200 City Square
NAIROBI, KENYA

Tel. +254-20-2224561, +254-20-3311641, +254-20-3311608

E-mail: arso@arso-oran.org
Web: www.arso-oran.org

ARSO Central Secretariat
International House 3rd Floor
P.O. Box 57363 — 00200 City Square
NAIROBI, KENYA

Tel: +254-20-2224561, +254-20-3311641, +254-20-3311608

E-mail: arso@arso-oran.org
Web: www.arso-oran.org



## Introduction

Barley (*Hordeum vulgare* L.) is one of the most ancient crops, and it has played a role in the human development of agriculture, civilizations, and cultures and the sciences of agronomy, physiology, genetics, breeding, malting, and brewing [1]. It is grown and/or used around the world. For many centuries, barley has fed livestock, poultry, people, and people's spirit. Barley was among the first domesticates playing an important role during the hundreds or thousands of years of human transition from a hunting and gathering to agrarian lifestyle in the "Fertile Crescent" of the Near East starting at least 10,000 years ago. The Fertile Crescent is considered the first of at least seven centres of agriculture origin in the world.

Barley was presumably first used as human food, raw or roasted and in breads, porridges, and soups, but eventually evolved primarily into a feed, malting, brewing, and distilling grain. Barley's decrease in prominence as a food grain was due in part to the rise in prominence of wheat and rice. In recent times, 55% – 60% of the barley crop has been used for feed, 30% – 40% for malt, 2% – 3% for food, and about 5% for seed. Barley is best known around the world today as a feed grain and as the premier malting and brewing grain.

Although barley utilization for food is relatively minor on a global basis today, throughout its history, barley has remained an important and major food source for some cultures principally in western and eastern Asia, as well as in the Himalayan nations and in northern and eastern Africa. There has been a resurgence of interest and use of barley for food, primarily due to an increasing emphasis on incorporating a diversity of whole grains in people's diets for health benefits. The benefits of foods containing barley have been endorsed principally due to its soluble fibre content (β-glucans), which has been shown to lower blood cholesterol levels with implications for heart health. Barley also seems to lower blood glucose levels (glycemic index) with implications for those suffering from diabetes [1].

Barley has evolved to include several morphological and commercial forms, including winter, spring, two-row, six-row, awned, awnless, hooded, covered, naked, hulless, and malting, feed (grain and forage), and food types. Barley is arguably the most widely adapted cereal grain species with good drought, cold, and salt tolerance. It is generally produced in temperate (winter and/or spring planting) and semiarid subtropical (winter planting) climates. It does not tolerate highly humid warm climates. Grain production occurs at higher latitudes and altitudes and farther into deserts than any other cereal crop.

Barley is traded mainly as barley grains but also as other value-added barley products such as malt, beer, malt extract, pearled barley, and barley flour and grits. Compared to trade of barley grain, malt, and beer, the trade of these other commodities is relatively minor.



# Barley grains — Specification

## 1 Scope

This Draft African Standard specifies the requirements, sampling and test methods for barley grains of varieties (cultivars) grown from *Hordeum vulgare* Lin and *Hordeum bulbosum* intended for human consumption,

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ARS 53, *General principles of food hygiene — Code of practice*

ARS 56, *Prepackaged foods — Labelling*

ISO 605*, Pulses — Determination of impurities, size, foreign odours, insects, and species and variety — Test methods*

ISO 711, *Cereals and cereal products — Determination of moisture content (Basic reference method)*

ISO 712*, Cereals and cereal products — Determination of moisture content — Routine reference method*

ISO 5223, *Test sieves for cereals*

ISO 20483, *Cereals and pulses — Determination of the nitrogen content and calculation of the crude protein content — Kjeldahl method*

ISO 24333, *Cereals and cereal products — Sampling*

## 3 Terms and definitions

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

**3.1**
**barley grain**
dried grain grainsof cultivated barley (*Hordeum vulgare* L. and *Hordeum bulbosum* L.)

**3.2**
**whole grains**
grains of barley obtained after proper threshing with no mechanical treatment

**3.3**
**adhered hulls**
grainsgrains of hulless varieties with hulls that have not been removed during harvesting. (see Varieties with adhered hulls)

**3.4**
**barley of other types**
in two-row barley, barley of other types is any six-row variety. In six-row barley, barley of other types is any two-row variety

**3.5**



**black barley**
barley with black hull

**3.6**
**broken grainsgrains**
barley that is mechanically damaged due to the harvesting or handling process with a quarter or more of the grain missing

**3.7**
**coloured aleurone layer**
refers to barley grains which have a coloured aleurone layer in the kernel. The colour is generally blue or black. Also includes black hulled varieties

**3.8**
**contaminants**
may generally be referred to as foreign matter and may consist of: cereal ergot; chemicals not approved for barley; coloured aleurone layer; earth; field insects – all others; field insects – sitona weevil; foreign grains (wheat, rye, triticale, cultivated oats, rice); foreign material; foreign seeds; objectionable material; pickling compounds; ryegrass ergot; sand; six row barley; smut; snails; stored grain insects and pea weevil – dead; stored grain insects and pea weevil – live; varietal purity; wild oats / wild radish

**3.9**
**damaged grains**
grains, pieces of barley grains, other grains, and wild oats that are badly ground-damaged, badly weather-damaged, diseased, frost-damaged, germ-damaged, heat-damaged, injured-by-heat, insect-bored, split or cleaved, skinned, mould-damaged, dry green or sappy, shot or sprout-damaged, dark tipped, or otherwise materially damaged.

Note to entry An individual kernel may have more than one defect.

**3.10**
**dark tipped**
refers to staining caused by excess moisture and / or humidity or a stress related biochemical reaction towards the end of the growing period and into harvest

Note to entry This mainly occurs at the germ end of the grain. Dark tipping equal to or greater than 1 mm is classified as defective grain.

**3.11**
**dockage**
all matter other than barley that can be removed from the original sample by use of an approved device and procedure.

Note to entry Also, underdeveloped, shrivelled, and small pieces of barley grains removed in properly separating the material other than barley and that cannot be recovered by properly rescreening or recleaning.

**3.12**
**dry green, sappy or immature grains**

a) green grains arising from harvesting of grain before it has matured. Dry green grains are those whose surface is distinctively green or those grains when cut show an intense green colour in the cross-section. Dry green grains are usually dry and hard.

b) sappy grains are those that have been harvested before maturity. Sappy grains are generally soft when pressed. They may or may not be green. Any level of sappiness is classified as defective.

**3.13**
**earth pellets**
clods of dirt, being 5mm or less in diameter.

**3.14**



**ergot**
plant disease producing elongated fungus bodies with a purplish-black exterior, a purplish-white to off white interior, and a relatively smooth surface texture when cereals and ryegrass grains are infected by the fungus *Claviceps purpurea*

**3.15**
**falling number**
a grain quality test which measures the degree of weather damage in barley and is based on the unique ability of alpha amylase (an enzyme released during seed germination) to liquefy a starch gel. Strength of the enzyme is measured by Falling Number defined as the time in seconds required to stir plus the time it takes to allow the stirrer to fall a measured distance through a hot aqueous flour or meal gel undergoing liquefaction. The Falling Number test is an alternative to the Rapid Visco Analyser (RVA)

**3.16**
**field fungi**
individual grains affected by the mould *Cladisporium spp*. which gives the grain the appearance of black spotting occurring anywhere on the grain.

Note to entry The mould usually occurs during periods of high moisture or high humidity towards the end of the growing period into harvest.

**3.17**
**field insects**
insect contaminants of grain that do not cause damage to stored grains. They include but are not restricted to: Desiantha Weevil (*Desiantha spp*); Fungus beetle (*Corticaria punctulata)*; Grasshoppers; Hairy Fungus Beetle (*Typhaea stercorea*); Ladybirds; Minute Mould Beetle (*Corticaria spp*); Mites *(Acarina spp);* Sitona Weevil (*Sitona spp*); Wood Bugs

**3.18**
**fireburnt grains**
grains charred or scorched by fire. A cross-section of a fireburnt grain resembles charcoal with numerous air holes

Note to entry The air holes result in a low weight kernel which crumbles easily under pressure.

**3.19**
**foreign grain**
wheat, rye, triticale, cultivated oats and rice grains only, for which a separate tolerance applies

Note to entry Other cereal grains, pulses and oilseeds are considered as foreign seeds.

**3.20**
**foreign matter**
all matter other than barley, other grains, and wild oats that remains in the sample after removal of dockage

**3.21**
**foreign seeds**
seeds of any plant, other than the species of crop being tendered for delivery

**3.22**
**frost damaged**
grain damaged as a result of frost during the maturation phase. Frost damaged barley grains appear pinched and sunken in on the back, usually on the awn half of the grain. In severe cases the grain under the husk will appear orange. For hulless varieties—frost-damaged grains have severe wrinkling and translucent endosperms

**3.23**
**fusarium damage**
grains of barley discoloured by pink, orange or black encrustations of fusarium mould. Under magnification, the black encrustations appear raised above the surface of the grain and are



surrounded by a white mould. The black encrustations can be scraped off. Some degree of judgment is required when identifying grains with the fusarium mould. Only those grains which meet this description are to be designated as fusarium damaged

**3.24**
**germ-damaged grains**
grains, pieces of barley grains, other grains, and wild oats that have dead or discoloured germ ends

**3.25**
**germinative capacity**
a measure of the barley grains capability to germinate while still in dormancy. It is usually measured in the laboratory to assess germination of potential late malt deliveries. Germinative capacity is also referred to as viability.

**3.26**
**germinative energy**
measures the germination of barley grains within a 24-hour period

**3.27**
**heat damaged, bin burnt or storage mould affected**

a) **heat damaged, bin burnt** — Heat Damaged or Bin Burnt refers to those grains that have become discoloured due to exposure to severe heat during storage or an incorrect artificial drying technique. Affected grains appear reddish/golden brown, or in severe cases, blackened.

b) **storage mould affected** — Storage Mould Affected refers to grains that have become affected by the development of fungi or bacteria due to an increase in grain moisture levels during storage. Affected grains appear discoloured and visibly affected by mould.

**3.28**
**immature and shrivelled grains**
grains that are not properly developed

**3.29**
**injured-by-frost grains**
grains and pieces of barley grains that are distinctly indented, immature, or shrunken in appearance or that are light green in colour as a result of frost before maturity

**3.30**
**injured-by-heat grains**
grains, pieces of barley grains, other grains, and wild oats that are slightly discoloured as a result of heat

**3.31**
**injured-by-mould grains**
grains and pieces of barley grains containing slight evidence of mould

**3.32**
**insect damaged**
grains eaten in part by stored grain insects and any field pests of grains. Grains may have a hole (commonly referred to as bored) or have a chewed appearance on any part of the grain.

**3.33**
**inseparable seeds**
seeds not removed by the cleaning process, usually large seeds

**3.34**
**mildew**



fungal condition that develops in unthreshed grain usually under conditions of excessive moisture. The affected grains are greyish in colour and lower in quality. In the evaluation of mildew, consider the number of affected grains and their severity

**3.35**
**mould-damaged grains**
grains, pieces of barley grains, other grains, and wild oats that are weathered and contain considerable evidence of mould

**3.36**
**objectionable material**
objectionable foreign matter that may or may not be otherwise stated in this standard which has the ability to degrade the hygiene of barley, become a food safety issue of concern or has a commercially unacceptable odour. This includes but is not limited to the following:

a) **animal material:** meat meal, bone meal, poultry offal, meal or any other animal proteins. Animal material also includes carcasses of dead animals such as rats and mice

b) **odour:** a commercially unacceptable odour is defined as a sour or musty or other objectionable odour emanating from the barley which is not natural or normally associated with barley

c) **stick:** ligneous material greater than 1cm in length and 0.5cm in diameter. Note that crop stubble greater than 3cm in length and 1cm in diameter is defined as a stick

*d)* **tainting agent:** a tainting agent is any contaminant that imparts a smell or taint to barley. It includes but is not limited to plant parts and seeds of *Eucalyptus spp.*

e) **stone:** a stone or gravel is defined as a lump or mass of hard consolidated mineral matter being greater than 2mm in length or diameter. Smaller material is defined as sand

f) **water:** the addition of water to grain prior to delivery is a prohibited practice

g) **other:** refers to any other commercially unacceptable contaminant such as animal excreta, glass, concrete, fertiliser or metal

**3.37**
**pea weevil**
insects of the species *Bruchus pisorum.* The tolerance applies to all life stages of the insect

**3.38**
**pickling compounds**
chemicals added to grain as a seed treatment or as a seed dressing prior to sowing

**3.39**
**poisonous, toxic and/or harmful seeds**
any seed which if present in quantities above permissible limit may have damaging or dangerous effect on health, organoleptic properties or technological performance such as Jimson weed — Datura (*D. fastuosa* Linn and *D. stramonium* Linn.) corn cockle (*Agrostemma githago* L., *Machai Lallium remulenum* Linn.) Akra (Vicia species), *Argemone mexicana*, Khesari and other seeds that are commonly recognized as harmful to health

**3.40**
**Rapid Visco Analyser (RVA)**
grain quality test which measures the degree of pre-harvest germination of malting barley and is based on the ability of the enzymes alpha amylase and (1,3 and 1,4) beta glucanase to be able to liquefy a starch gel. The strength of enzyme activity and therefore the degree of germination is measured by the RVA as defined by the force required to stir an aqueous barley meal mixture over a defined time period. The result of the RVA is a Stirring Number. The RVA is an alternative to the Falling Number test.



**3.41**
**retention**
material retained above the 2.50mm screen after a sample of barley grain is subjected to the screening process

**3.42**
**rotten grains**
grains that are discoloured, swollen, soft and spongy as a result of decomposition by fungi or bacteria. Consider rotted grains in combination with severely mildewed and heated

**3.43**
**sand grain**
particle of unconsolidated (loose), rounded to angular rock fragment or mineral grain between 0.06mm and 2.00mm in diameter

**3.44**
**sclerotinia sclerotiorum**
fungus producing hard masses of fungal tissue, called *sclerotia*

**3.45**
**skinned and broken grains**
barley grains that have one-third or more of the hull removed, or that the hull is loose or missing over the germ, or broken grains, or whole grains that have a part or all of the germ missing. Each grain exhibiting one of more of the following characteristics is assessed as a skinned grain:

— **awn skinning**: greater than a third of the husk from the awn end towards the centre of the grain has been removed

— **chipped**: approximately one third of the grain has been removed at the awn end of the grain

— **germ exposed**: the husk is removed from the germ end of the grain or the germ itself has been removed

— **pearled**: the entire husk has been removed

— **side or back skinning**: one third or more of the husk is missing from the side or the back of the grain

— **split backs** — the husk is split along the length of the centre ridge of the back of the grain.

— **split skirt:** the husk is split along the centre or side edges, on the back of the grain, at the germ end

**3.46**
**small foreign seeds**
all small foreign seeds in the unmillable material fraction which have fallen below the screen during the screening process, except those specifically mentioned in the Foreign Seeds definition.

**3.47**
**snails**
whole or substantially whole (more than half) snail shells, irrespective of size

**3.48**
**shot or sprouted**
barley grains exhibiting the following outward signs: (i) bursting of the grain at the germ end; (ii) the husk has a distinct pin hole at the germ end and may have ‘tramlines’ where the husk has begun to lift on each side on the back of the grain at the germ end. Sprouted grains are those with any visible evidence of root system beginning to emerge

**3.49**
**six rows**



barley varieties with six grain rows in the head. It is generally recognised that two-row barley is best suited for malting and six-row barley is only suitable for feed purposes

**3.50**
**sound barley**
grains and pieces of barley grains that are not damaged as defined in this clause

**3.51**
**split or cleaved**
this defect occurs where the split of the kernel has penetrated through the husk and into the endosperm

**3.52**
**stones**
hard shale, coal, hard earth pellets, and any other non-toxic materials of similar consistency

**3.53**
**stored grain insects**
insects which cause damage to stored grain, including: Angoumois Grain Moth (*Sitrotroga cerealella)*; Confused Flour Beetle (*Tribolium confusum)*; Flat Grain Beetle (*Cryptolestes spp)*; Granary Weevil (*Sitophilus granarius)*; Indian Meal Moth (*Plodia interpunctella)*; Khapra Beetle (*Trogoderma granarium)*; Lesser Grain Borer (*Rhyzopertha dominica)*; Maize Weevil (*Sitophilus zeamais)*; Psocids/Book lice (*Psocoptera sp*); Rice Weevil (*Sitophilus oryzae)*; Rust-red Flour Beetle (*Tribolium castaneum)*; Saw Tooth Grain Beetle (*Oryzaephilus surinamensis*); Tropical Warehouse Moth (*Ephestia cautella)*; Warehouse Beetle (*Trogoderma variable)*

Note to entry For dead stored grain insects, pieces of insects that are not whole or not readily able to be identified by species are classified as foreign material.

**3.54**
**test weight**
density of a measured volume of grain expressed in kilograms per hectolitre

**3.55**
**thin barley grains**
thin barley shall be defined for the appropriate class as follows:

a) **malting barley** — Six-rowed malting barley that passes through a 1.98 mm x 19.05 mm slotted-hole sieve and Two-rowed Malting barley which passes through a 2.18 mm x 19.05 mm slotted-hole sieve

b) **barley** — Six-rowed barley, Two-rowed barley, or Barley that passes through a 1.98 mm x 19.05 mm slotted-hole sieve

**3.56**
**unmillable material below the screen (screenings)**
total material passing through a 2.20mm screen after a sample of grain is subjected to the screening process. It includes small foreign seeds

**3.57**
**variety**
next lowest level taxonomic rank of a plant below that of the term “species”

**3.58**
**varieties with adhered hulls**
varieties with adhered hulls are any grains of non-hulless varieties

**3.59**
**weathered grains**
grains discoloured by weathering to a very deep yellow or light brown. Severely weathered grains are severely discoloured. They may be dark brown, heavily stained or distinctly bleached and may also



be mildewed. Consider the number of affected grains and their condition when you assess the general colour of the sample.

**3.60**
**weevilled grains**
grains that are partially or wholly bored by insects injurious to grains but does not include germ eaten grains and egg spotted grains

**3.61**
**wild oats, wild radish**
wild oats are annual grassy weeds. The seeds vary in colour from white to black. They are normally more slender than domestic oats, and have a slanting, circular depressed scar, sometimes called a sucker mouth, at the base, and a bent twisted awn. *Wild oats* and *wild radish* are assessed separately from *foreign seeds*.

**3.62**
**filth**
impurities of plant and animal origin including insects, rodent hair and excreta

# 4 Requirements

## 4.1 General requirements

**4.1.1** Barley grains shall

*a)* be the dried mature grains of *Hordeum vulgare Linn and Hordeum bulbosum'*;

b) be sweet, hard, clean, wholesome, uniform in size, shape, colour and in sound merchantable condition;

c) be free from a substance which renders it unfit for human or animal consumption or processing into or utilisation thereof as food or feed;

d) be free of pests, live animals, animal droppings, fungus infestation, added colouring matter, moulds, impurities of plant and animal origin including insects, rodent hair and excreta and shall meet any other sanitary and phytosanitary requirements';

e) be free from filth in amounts that represent a hazard to human health;

f) be free from toxic or noxious seeds that are commonly recognized as harmful to health;

g) be free from abnormal flavours, musty, sour or other undesireable odour, obnoxious smell and discolouration;

h) be free from micro-organisms and substances originating from micro-organisms, fungi or other poisonous or deleterious substances in amounts that may constitute a hazard to human health.

i) be free from glass, metal, coal or dung; and

j) comply with the requirements for declared plant injurious organisms of phytosanitary importance as determined by the plant health protection agency.

**4.1.2** Barley grains shall be in the form of well-filled seeds of uniform colour.

**4.1.3 Classes**

Barley is divided into three classes based on end use, malting and general purpose:



**(a) malting**

malt class barley is highly desired for the malting process which involves a controlled process where barley has been allowed to sprout for use chiefly in brewing and distilling. The class malting barley is divided into the following three subclasses:

(i) **Six-rowed malting barley**. Barley that has a minimum of 95.0 percent of a six-rowed suitable malting type that has 90.0 percent or more of grainsgrains with white aleurone layers that contains not more than 1.9 percent injured-by-frost grains, 0.4 percent frost-damaged grainsgrains, 0.2 percent injured-by-heat grainsgrains, and 0.1 percent heat-damaged grainsgrains. Six-rowed Malting barley shall not be infested, blighted, ergoty, garlicky, or smutty. A head of six-row barley contain six rows of grainsgrainsalong its length, in two groups of three grains each.

(ii) **Six-rowed blue malting barley**. Barley that has a minimum of 95.0 percent of a six-rowed suitable malting type that has 90.0 percent or more of grains with blue aleurone layers that contains not more than 1.9 percent injured-by-frost grains, 0.4 percent frostdamaged grains, 0.2 percent injured-by-heat grains, and 0.1 percent heat-damaged grains. Six-rowed blue malting barley shall not be infested, blighted, ergoty, garlicky, or smutty.

(iii) **Two-rowed malting barley**. Barley that has a minimum of 95.0 percent of a two-rowed suitable malting type that contains not more than 1.9 percent injured-by-frost grains, 0.4 percent frost-damaged grains, 0.2 percent injured-by-heat grains, 0.1 percent heat-damaged grains, 1.9 percent injured-by-mould grains, and 0.4 percent mould-damaged grains. Two-rowed malting barley shall not be infested, blighted, ergoty, garlicky, or smutty as defined. A head of two-row barley contains two rows of grains along its length. It is generally recognised that two-row barley is best suited for malting and six-row barley is only suitable for feed purposes.

**(b) general purpose barley**

general purpose class include barley not selected for malting usually denoted as “barley”. The class Barley is divided into the following three subclasses:

(i) **Six-rowed barley** — Any six-rowed barley that contains not more than 10.0 percent of two-rowed varieties.

(ii) **Two-rowed barley** — Any two-rowed barley with white hulls that contains not more than 10.0 percent of six-rowed varieties.

(iii) **Barley** — Any barley that does not meet the requirements for the subclasses six-rowed barley or two-rowed barley.



## 4.2 Specific requirements

### 4.2.1 General purpose barley grades

General purpose barley grains for human consumption shall be classified into four grades on the basis of the tolerable limits established in Table 1 when tested in accordance with the test methods specified therein which shall be additional to the general requirements set out in this standard.

**Table 1 — Specific requirements for general purpose barley grains**

| Characteristic | | Requirement | | | | Test method |
|---|---|---|---|---|---|---|
| | | Grade 1 | Grade 2 | Grade 3 | Grade 4 | |
| **Varietal purity,** (% by count) (all approved varieties), min. | | 95.0 | 95.0 | 95.0 | 95.0 | ISO 605 |
| **Moisture**, %, max. | | 13.5 | 13.5 | 13.5 | 13.5 | ISO 711<br>ISO 712 |
| **Protein,** %, (N X 6.25 @ 0% moisture basis), min. | | 8.0 | 8.0 | 8.0 | 8.0 | ISO 20483 |
| **Test weight,** (kg/hl), min | | 63(303) | 60(288) | 57(274) | 54(260) | ISO 605 |
| **Sound barley**, % by weight, min. | | 97.0 | 94.0 | 90.0 | 85.0 | |
| T**hin barley**, % by mass, max. | | 10 | 15 | 25.0 | 35.0 | ISO 5223 |
| **Foreign matter**, % by mass, max. | Other cereal grains | 1.5 | 2.5 | 8.0 | 10 | ISO 605 |
| | Ergot | 0.05 | 0.05 | 0.10 | 0.10 | |
| | Excreta | 0.01 | 0.01 | 0.02 | 0.02 | |
| | Inseparable seeds | 0.20 | 0.20 | 0.50 | 1.0 | |
| | Sclerotinia | 0.05 | 0.05 | 0.20 | 0.20 | |
| | Stones | 0.15 | 0.15 | 0.20 | 0.20 | |
| | Wild oats | 1.0 | 1.0 | 2.5 | 2.5 | |
| | **Total** | **2.5** | **2.5** | **10.0** | **10.0** | |
| **Defective grains**, max (% by count, 100 grain sample, unless otherwise stated | Fireburnt | Nil | 0.50 | 0.50 | 0.25 | |
| | Fusariam | 0.25 | 0.50 | 1.0 | 1.0 | |
| | Heated, rotted, mildewed | 0.20 | 0.30 | 0.5 | 1.0 | |
| | Sprouted | 0.50 | 2.0 | 10.0 | 10.0 | |
| | Broken, immature, weevilled | 4.0 | 5.0 | 8.0 | 10.0 | |
| | Total | 2.0 | 4.0 | 6.0 | 8.0 | |
| Total damage & foreign material, % mass, max. | | 3 | 5 | 8 | 10 | |
| **Foreign seed contaminants, Max – (count of seeds in total per half litre unless otherwise stated)** | Foreign grain | 85 | 85 | 85 | 85 | |
| | Variation (wild oats, wild radish) | 25 | 25 | 25 | 25 | |
| | Small foreign seeds (% by wt) | 0.6 | 0.6 | 0.6 | 0.6 | |
| **Other contaminants, Max - (count per half litre, unless otherwise stated)** **[Total includes any combination: If any one contaminant exceeds the maximum total, failure is declared)** | Total aflatoxin including (AFB1+AFB2+AFG1 +AFG2), ppb | 10 | 10 | 10 | 10 | |
| | Aflatoxin B1 only, ppb | 5 | 5 | 5 | 5 | |
| | Total fumonisin including (FB1 + FB2 + FB3), ppb | 2 | 2 | 2 | 2 | |
| | Cereal smut / cereal ergot | Nil | Nil | Nil | Nil | |
| | Loose smut (weight in grams)(Weight of all pieces per half litre) | 0.1 | 0.1 | 0.1 | 0.1 | |
| | Pickling compounds (entire load) | Nil | Nil | Nil | Nil | |
| | Chemicals not approved for barley | Nil | Nil | Nil | Nil | |
| | Stored grain insects & pea weevil – live (entire load) | Nil | Nil | Nil | Nil | |
| | Stored grain insects & pea weevil – Dead | 10 | 10 | 10 | 10 | |
| | Field insects – Sitona weevil (dead or alive) | 10 | 10 | 10 | 10 | |
| | Field insects – All others (dead or alive) | 3 | 3 | 3 | 3 | |
| | Snails (dead or alive) | 2 | 2 | 2 | 2 | |
| | Sand (individual grains) | 50 | 50 | 50 | 50 | |
| | Earth (5 mm max in diameter) | 3 | 3 | 3 | 3 | |
| | Stones (entire load) | Nil | Nil | Nil | Nil | |
| | Objectionable material (entire load) | Nil | Nil | Nil | Nil | |
| | Total | **10** | **10** | **10** | **10** | |

## 4.3 Malt barley grains

**Table 2 — Specific requirements for malt barley grains**

| Characteristic | | Requirement | | | Test method |
|---|---|---|---|---|---|
| | | Grade 1 | Grade 2 | Grade 3 | |
| Varietal purity, (% by count) (all approved 2 row malting varieties), min. | | 95 | 95 | 95 | ISO 605 |
| Moisture, %, max. | | 12.5 | 12.5 | 12.5 | ISO 711<br>ISO 712 |
| Protein, %, (N X 6.25 @ 0% Moisture Basis), min. | | 9.0 | 9.0 | 9.0 | |
| Protein, %, (by Dumas method), max. | | 12.0 | 12.0 | 12.8 | |
| Test weight, (kg/hl), min. | | 65.0 | 65.0 | 65.0 | ISO 605 |
| **Retention,** % by weight (**3.51**), min. | | 70.0 | 62.0 | 58.0 | |
| **Screenings,** % by weight, all varieties except Franklin (**3.55**), max. | | 7.0 | 10.0 | N/A | ISO 5223 |
| **Screenings,** % by weight, Franklin variety ONLY (**3.55**), max. | | 10.0 | N/A | N/A | ISO 5223 |
| Germinative energy, %, (IOB 4ml germinative energy test), min. | | 95 | 95 | 95 | IOB Methods of Analysis |
| Germinative capacity, %, (IOB germinative capacity test (stain)), min. | | 98 | 98 | 98 | |
| Rapid visco analyser, (units) (rva units), min. | | 130 | 130 | 130 | AACC 22-08 |
| Falling number, (sec) (falling number result), min. | | 300 | 300 | 300 | ISO 3093 |
| **Defective grains**, max (% by count, 100 grain sample, unless otherwise stated | Shot or sprouted | Nil | Nil | Nil | |
| | Dark tipped | 10.0 | 10.0 | 10.0 | |
| | Field fungi | 5.0 | 5.0 | 5.0 | |
| | Skinnings | 15.0 | 15.0 | 15.0 | |
| | Insect damaged (count per half litre) | 10 | 10 | 10 | |
| | Split or cleaved | 1.0 | 1.0 | 1.0 | |
| | Broken (% wt 100 gram sample) | 2.0 | 2.0 | 2.0 | |
| | Frost damaged | 5.0 | 5.0 | 5.0 | |
| | Dry green or sappy | 1.0 | 1.0 | 1.0 | |
| | Heat damaged, bin burnt or storage mould affected (entire load) | Nil | Nil | Nil | |
| | **Total defective** | **2.0** | **5.0** | **8.0** | |
| **Foreign seed contaminants, Max – (count of seeds in total per half litre unless otherwise stated)** | Foreign grain(wheat, cereal rye, triticale, cultivated oats, rice) | 85 | 85 | 85 | |
| | Variation (wild oats, wild radish) | 25 | 25 | 25 | |
| | Small foreign seeds (% by weight) | 0.6 | 0.6 | 0.6 | |
| **Other contaminants, Max - (count per half litre, unless otherwise stated)** **[Total includes any combination: If any one contaminant exceeds the maximum total, failure is declared)** | Total aflatoxin including (AFB1+AFB2+AFG1 +AFG2), ppb | 10 | 10 | 10 | |
| | Aflatoxin B1 only, ppb | 5 | 5 | 5 | |
| | Total fumonisin including (FB1 + FB2 + FB3), ppb | 5 | 5 | 5 | |
| | Foreign material (% by weight)(other than already specified) | 1.0 | 1.0 | 1.0 | |
| | Cereal smut / cereal ergot | Nil | Nil | Nil | |
| | Loose smut (weight in grams)(Weight of all pieces per half litre) | 0.1 | 0.1 | 0.1 | |
| | Ryegrass ergot (length in cm of all pieces present aligned end on end) | 0.5 | 0.5 | 0.5 | |
| | Pickling compounds (entire load)(pickled grain) | Nil | Nil | Nil | |
| | Chemicals not approved for barley (entire load) | Nil | Nil | Nil | |
| | Stored grain insects & pea weevil – Live (entire load) | Nil | Nil | Nil | |
| | Stored grain insects & pea weevil – Dead | 10 | 10 | 10 | |
| | Field insects – Sitona weevil (dead or alive) | 10 | 10 | 10 | |
| | Field insects – All others (dead or alive) | 3 | 3 | 3 | |
| | Snails (dead or alive) | 2 | 2 | 2 | ISO 605 |
| | Sand (individual grains) | 50 | 50 | 50 | |
| | Earth (5mm max in diameter) | 3 | 3 | 3 | |
| | Stones (entire load) | Nil | Nil | Nil | |
| | Objectionable material (entire load) | Nil | Nil | Nil | |
| | **Total** | **10** | **10** | **10** | |



# 5 Contaminants

## 5.1 Pesticide residues

Barley grains shall comply with those maximum pesticide residue limits established by the Codex Alimentarius Commission for this commodity.

### 5.2 Heavy metals

Barley grains shall comply with those maximum levels for heavy metal contaminants established by the Codex Alimentarius Commission for this commodity.

## 6 Hygiene

**6.1** It is recommended that the produce covered by the provisions of this Standard be prepared and handled in accordance with the appropriate sections of ARS 53.

## 7 Packaging

**7.1** Barley grains shall be packed in suitable packages which shall be clean, sound, free from insect, fungal infestation and the packing material shall be of food grade quality.

**7.2** Barley grains shall be packed in containers which will safeguard the hygienic, nutritional, technological and organoleptic qualities of the products.

**7.3** The containers, including packaging material, shall be made of substances which are safe and suitable for their intended use. They shall not impart any toxic substance or undesirable odour or flavour to the product.

**7.4** Each package shall contain barley grains of the same variety and of the same grade designation.

**7.5** Each package shall be securely closed and sealed.

## 8 Weights and measures

Barley grains shall be packaged in accordance with the weights and measures regulations of the destination country.

NOTE Maximum package weight of 50 kg where human loading and offloading is involved'.

## 9 Labelling

**9.1** In addition to the requirements in ARS 56, each package shall be legibly and indelibly marked with the following:

a) product name as "Barley Grains for general purpose", "malting" or "animal feed";

b) variety;

c) grade;

d) name, address and physical location of the manufacturer/ packer/importer;

e) lot/batch/code number;

f) net weight, in g/kg;

g) the declaration "Food for Human Consumption'';

h) storage instruction as "Store in a cool dry place away from any contaminants'';

i) crop year;



j) packing date;

k) expiry date or best before _____month _____ year;

l) a declaration of the product lifespan;

m) instructions on disposal of used package;

n) country of origin; and

o) a declaration on whether the barley was genetically modified or not.

**9.2** The authorized packer shall observe all instructions regarding testing, grading, packing, marking, sealing and maintenance of records applicable to the product.

## 10 Sampling

Sampling shall be done in accordance with ISO 24333.



# Annex A
(informative)

# Sampling for analysis

## A.1 General

The following section details methods and procedures to be used for the assessment of various quality parameters as outlined in this standard.

Field/Routine Assessment Methods are included as a guide to industry where Reference Methods may not be able to be implemented. Note that Field Assessment Methods must equate to the Reference Method for the applicable test method.

In all instances of disputes, the Reference Method takes precedence over the Field Assessment Method.

Depending on the test to be conducted, variations may exist due to equipment used.

Procedures outlined are a guide for industry. Industry is free to develop their own Operational Procedures for each test and activity based on their own circumstances. At all times industry use of apparatus outlined in this Standard must comply with the manufacturers' recommendations for occupational health and safety and training.

## A.2 Sampling

### A.2.1 Definitions

This is the standard procedure used to draw a sample of the commodity from a bulk unit tendered for delivery to enable tests to be conducted on the commodity for the purposes of determining its quality.

— A primary sample is an individual probed sample taken from the lot presented for sampling

— A composite sample is the combined primary samples taken from the lot to be sampled, and is representative of the entire lot

— A sub sample is the sample taken from the mixed composite sample for the purposes of conducting quality tests, and is representative of the entire lot

### A.2.2 Scope

Barley is traded on the basis of quality tests conducted on lots of barley presented for sale or delivery to end users. Obtaining representative samples is critical to ensuring test results reflect the true quality of these lots.

This procedure is applicable to all cereal grains, pulses and oilseeds.

### A.2.3 Apparatus

— Manual sampling probe (double tube compartment probe, one inside the other, equipped with spiralled ports that open sequentially from bottom to top).

— Vacuum or pneumatic probe (an alternative to the manual sampling probe and consisting of a hand held or remotely controlled probe which retrieves grain through the use of a vacuum or other air movement system).

— Mixing bucket (including other associated equipment such as mini-auger suitable for mixing sample, optional).

— Sample dividing apparatus (optional).



### A.2.4 Reagents

Not Applicable.

### A.2.5 Procedure

**Sample collection guidelines for collecting a representative sample**

— The surface of the grain should be fully exposed prior to sampling to allow for effective visual inspection. At this point, the load should be scanned for any defects or contaminants.

— The probe to be used should be of a sufficient length in order to obtain a sample from as close as possible to the bottom of truck.

— A primary sample must be drawn for assessment by thrusting the sampling probe as vertically and as deep as possible into the load.

— At least one probe must be taken from the front, middle and rear of each bulk unit.

— If more than one unit is delivered, samples must be drawn from each bulk unit as described above.

— If the bulk units are of visibly different quality, or if required at the Receival Agents discretion, different samples and grade classification may be undertaken for each separate bulk unit.

— If the declared varietal composition or paddock where the grain was grown is different for each unit tendered for delivery, or more than one variety is commingled in each delivery unit, then a separate assessment of each unit must be conducted.

— Each primary (probed) sample must consist of at least one litre of grain.

— A composite sample from each load tendered for delivery shall consist of the following minimum quantities and number of probes:

| Load Size | Sample Size (minimum) |
|---|---|
| 10 tonnes or less | 3 litres |
| Over 10 tonnes up to 20 tonnes | 4 litres |
| Over 20 tonnes up to 30 tonnes | 5 litres |
| Over 30 tonnes up to 40 tonnes | 6 litres |
| Over 40 tonnes up to 50 tonnes | 7 litres |
| Over 50 tonnes up to 60 tonnes | 8 litres |
| Over 60 tonnes up to 70 tonnes | 9 litres |
| Over 70 tonnes up to 80 tonnes | 10 litres |
| Note – in the above table the sample size reflects the number of probe samples. For example, 4 litres equates to 4 probe samples | |

**Sample mixing**

— The primary samples in each probe must be collected together and thoroughly mixed in a suitable container using a mechanical device where appropriate, to form the composite sample.

— Sub samples should be drawn from the composite sample either by hand or through the use of a suitable sample dividing apparatus.

**Sample analysis**

— The sub sample should then be analyzed for all of the quality parameters specified in this Standard or in the Receival Agent's agreement with the buyer concerned if different from this Standard.

— Results should be entered on the Receival Agents sample receipt.



### A.2.6 References

Sampling shall be carried out in accordance with ISO 24333.

# Annex B
(informative)

## Moisture assessment of cereals: Fan-forced reference method

### B.1 Definitions

This is the fan forced reference method specified in National Measurement Institute legislation to be used to determine the moisture content of grain samples as loss in weight when subjected to heating.

### B.2 Scope

This is applicable to all cereals when being tested for moisture content under laboratory conditions.

### B.3 Apparatus

— Laboratory Mill

— Forced Draft Oven capable of being maintained at 130 °C ± 1 °C

— Aluminium moisture dishes, 50 – 55 by 15 – 20mm with tight fitting covers

— Desiccator

— Electronic balance capable of weighing up to 100g to 4 decimal places

### B.4 Reagents

Not applicable

### B.5 Procedure

— Grind a 30-40g whole grain sample in a suitable mill (Perten 3303, Tecator, Cemotec or similar). Sample to be “as is”.

— Mix thoroughly and transfer 2 to 3g portions to each of 2 or more tared moisture dishes

— Cover and weight the dishes immediately

— Subtract tare weights and record weight of sample

— Clean mill between samples

— Uncover the dishes and place them in pre heated oven (130 °C) and place covers under the dishes. Evenly distribute the dishes within the oven

— Close oven door and allow temperature to stabilize and then heat for exactly 60 minutes

— Remove the dishes, quickly replace the lids and place in the desiccator

— Weigh the dishes after they reach room temperature

— Determine loss in weight as moisture as per the following equation:

$$\% \text{ Moisture} = \frac{W_{\text{dry}} - W_{\text{dish}}}{W_{\text{tp}}} \times 100$$

where

$W_{tp}$ is the weight of the test portion before oven drying

$W_{dry}$ is the weight of the dish, lid and test portion after oven drying

$W_{dish}$ is the weight of the empty oven moisture dish and lid

Report result to the nearest 0.1%.

If duplicates differ by more than 0.2%, repeat the determination, otherwise, report the average of the duplicates.

### B.6 References

ISO 711, *Cereals and cereal products — Determination of moisture content (Basic reference method)*

# Annex C
(informative)

## Moisture assessment of cereals: Brabender oven reference method

### C.1 Definitions

This is the Brabender Oven reference method used to determine the moisture content of grain samples as loss in weight when subjected to heating.

### C.2 Scope

This is applicable to all cereals when being tested for moisture content.

### C.3 Apparatus

— Mill - A low moisture loss mill must be used as significant levels of heat can be generated. The mill of choice is the Falling Number 3303 mill (a Wiley - using a 20 mesh screen). The Falling Number Mill 3303 is used with the setting – Barley – 0.

— Electronic balance – accuracy = 0.001g (or better)

— Aluminium dishes - these dishes must be kept clean and weigh 11.500 ± 0.005g

— Vial with well sealing screw to lid. Currently a small yellow top polyethylene container with polypropylene lid is used. Samples must be prepared and used within 24hrs.

### C.4 Reagents

Not Applicable

### C.5 Procedure

— Grind approx 50g of sample in accordance with relevant mill manual. Mix sample well and replace into original sample vial tightly sealing the lid. Sample must be prepared and used on the same day or prepared on the evening before.

— Make sure the dishes are clean and are resting on a clean surface (wipe with tissue). Tare the first dish and also subsequent dishes used but note the weight before taring if weight varies from 11.500 or tare varies by ±0.010g from tare. Recheck weight of dish to ensure within 11.500 ± 0.005g. Dishes must also be checked before and after the season to ensure they are correct.

— Weigh out accurately 10.000 ± 0.001g of the ground sample into an Aluminium dish. Then shake dish to obtain an even layer of sample.

— Take the weighed samples and place into the oven which has been previously switched on and heated to 130 °C. Place the dishes in the oven noting the number of the dish and its position number (1 through 9). There are ten positions in the oven (the tenth place is taken up by an empty dish for calibration purposes).

— When the oven has been loaded note the time or set a countdown timer to 60 mins once the required temperature is reached. Usually for 130°C the oven takes 10 – 15 minutes to reach the required temperature.

— When one hour has elapsed, standardise the instrument by selecting the empty dish and placing 9g in weights in the small platform between the 3 prongs on the balance and adjust the scale to 10.0 with the standard swinging freely. Moisture can then be read off for each sample in turn.



— Read the samples in the dishes consecutively recording results in the relevant worksheet.

NOTE:

— When switching the oven on make sure that the Brabender oven is level (use bubble level).

— All results are a direct reading of % w/w water.

— The minimum heating time must be adhered to (1 hour) but heating over the hour will not affect the results (up to 2 hours).

— If only a few grams of sample are available see the manufacturers hand book for the technique to be adopted.

— The weight of Aluminium dishes is to be checked at 6 monthly intervals to ensure they are within 11.500 +/-0.005g. If they are underweight they are to be discarded and replacements purchased. Do not add weight to the dish i.e. solder etc as this will breakdown over time or fall off. If they are overweight they may be cleaned with warm water and neutral detergent. Under no circumstances use abrasive or corrosive chemicals as this will lead to the dish being underweight.

### C.6 References

ISO 711, *Cereals and cereal products — Determination of moisture content (Basic reference method)*



# Annex D
(informative)

## Moisture assessment of cereals: NIR

### D.1 Definitions

This describes the NIR method for determination of moisture in cereal grains.

### D.2 Scope

This procedure is applicable to all cereal grains.

### D.3 Reagents

Not applicable.

### D.4 Apparatus

NIR instrument approved for use for trade purposes under the conditions currently being developed by the National Measurement Institute.

### D.5 Method

Sample to be “as is”.

Individual manufacturer instructions and procedures should be followed for operation and maintenance of NIR instruments used to determine grain moisture.

Report result to the nearest 0.1%.

### D.6 References

ISO 712, *Cereals and cereal products — Determination of moisture content — Routine reference method*

# Annex E
(informative)

## Protein assessment of cereals: Dumas reference method

### E.1 Definitions

This is the Dumas reference method used to determine the crude protein content of cereal grains. Samples are incinerated in an oxygen rich atmosphere to produce oxides of nitrogen which are catalytically reduced to molecular nitrogen. Interfering combustion products are removed by selective absorption. Nitrogen concentration is then measured by a thermal conductivity detector calibrated against a standard of known nitrogen content. Protein is then calculated from nitrogen content using a known factor for each product.

### E.2 Scope

This method is applicable to all cereal grains.

### E.3 Apparatus

— Combustion nitrogen analyser consisting of a furnace capable of maintaining minimum operating temperature of 950 °C for pyrolysis of the sample in pure oxygen, an isolating system capable of isolating liberated nitrogen gas from other combustion products for subsequent measurement by thermal conductivity detector, a device for converting $NO_x$ products to nitrogen or measuring $NO_2$, and a detector system capable of interpreting detector response as percent N.

— Grinder or mill that produces ground material with particle size ≤ 0.8mm and with minimal heat generation.

— Analytical balance accurate to at least 0.0005g.

### E.4 Reagents

— Gases – carrier gas (usually helium), pure (99.9%) oxygen, compressed air (used to drive component parts of the analyser)

— Reference calibration standard – TRIS - high purity (hydroxymethyl) aminomethane or Nicotinic acid

### E.5 Procedure

— Follow procedures to set up the analyser and operating gas systems as specified by the manufacturer. Perform the necessary adjustments for gas flows and pressures, combustion temperatures and times and start up equilibrium times to ensure optimal analysis conditions for the type of sample to be analysed.

— Calibrate the instrument by following the manufacturer's guidelines using the appropriate calibration standard. The calibration should be cross checked against a second high purity standard – Nicotinic Acid or EDTA. Blanks, as stipulated by the manufacturer, should be run prior to analysis to establish the baseline. These should include consideration of an atmospheric blanks factor or a sample blank similar to samples under test.

— Grind an amount of sample sufficient to represent the original material, and to perform a number of nitrogen determinations as required. Sample to be "as is".

— Weigh accurately to 0.001g an amount of ground sample, as recommended by the manufacturer, into the appropriate sample capsule and place the sample into the instrument for analysis.

— If presenting the sample to the instrument in a pellet form, adjustments may be required to burn temperatures, times and blanks to compensate for the absence of a sample capsule.

— Blank and standard control/check samples should be repeated periodically (as a guide every 10 samples) during each analytical run to monitor any drift. Standard drift corrections and recalculation of samples should be made after analysis if the drift exceeds specification.

— Calculation of nitrogen content is usually performed automatically by the instrument data processing system or associated software.

— Results should be expressed as percent (5) nitrogen to two decimal places. For conversion to protein content “as is” multiply barley nitrogen by 5.7% and all other cereals by 6.25 unless otherwise stated. Convert protein content to an 0% moisture basis for barley for the nitrogen/protein values where necessary. Report result to the nearest 0.1%.

— Analysis should be repeated if the difference between duplicate test results exceed the respective repeatability values (r) shown in the following table:

| Grain | Mean % N | Repeatability | | Reproducibility | |
|---|---|---|---|---|---|
| | | r | RSDr % | R | RSDr % |
| Barley | 1.85 | 0.06 | 1.22 | 0.11 | 2.09 |
| Barley malt | 1.49 | 0.04 | 0.99 | 0.08 | 1.97 |
| Sorghum | 1.47 | 0.05 | 1.15 | 0.07 | 1.69 |
| Wheat durum | 2.09 | 0.04 | 0.64 | 0.08 | 1.32 |
| Wheat* | 1.97 | 0.03 | 0.61 | 0.09 | 1.69 |
| Wheat APH | 2.54 | 0.03 | 0.46 | 0.08 | 1.15 |
| Wheat flour | 2.03 | 0.03 | 0.46 | 0.09 | 1.56 |
| * Wheat other than the type specified in the above table | | | | | |

— Suitable fineness of grind gives a relative standard deviation (RSD) of ≤ 2.0% for ten successive determinations of nitrogen in ground test material. A larger RSD indicates the need for a finer grind or a larger analytical test weight, assuming that the instrument has been properly set up.

— For each batch the accuracy of the system is demonstrated by making ten successive determinations of nitrogen in nicotinic acid or tryptophan (different materials from calibration standard). Means of determinations must be ≤ ± 0.15 of respective theoretical values with standard deviation ≤ 0.15. Failure to achieve these values indicates the need for recalibration or optimisation of instrument settings.

— Accuracy checks should be carried out (1) On instrument installation and reinstallation following repairs and service; (2) When a new batch of working reference material is used; (3) After experiencing problems in instrument set up.

### E.6 References

ISO/TS 16634-2, *Food products — Determination of the total nitrogen content by combustion according to the Dumas principle and calculation of the crude protein content — Part 2: Cereals, pulses and milled cereal products*



# Annex F
(informative)

## Protein assessment of cereals: NIR

### F.1 Definition

This describes the NIR method for determination of protein in cereal grains.

### F.2 Scope

This procedure is applicable to all cereal grains.

### F.3 Reagents

Not applicable.

### F.4 Apparatus

NIR instrument approved for use for trade purposes.

### F.5 Method

Sample to be “as is”.

Individual manufacturer instructions and procedures should be followed for operation and maintenance of NIR instruments used to determine grain protein.

Report result to the nearest 0.1%.

### F.6 References

ISO 20483, *Cereals and pulses — Determination of the nitrogen content and calculation of the crude protein content — Kjeldahl method*

# Annex G
(informative)

## Test weight assessment: Schopper Chondrometer reference method

### G.1 Definitions

The Schopper Chondrometer is used for the measurement of Grain Density (Density is also known as “Bushel Weight”, “Test Weight” or “Hectolitre Weight”).

### G.2 Scope

This method is applicable to all cereal grains.

### G.3 Apparatus

— 1L Schopper Calibrated Chondrometer

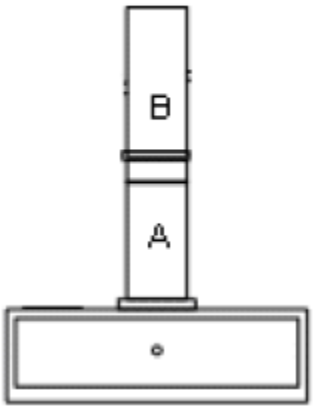
— 2 decimal place balance

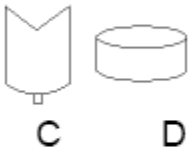
— Plastic bowl

### G.4 Reagents

Not applicable

### G.5 Procedure




— Secure bottom half of cylinder A to base plate on the chondrometer box.

— Ensure the sliding divider C is in the slot on cylinder A.

— Place weight D on top of sliding divider.

— Secure top half of cylinder B to the bottom half A.

— Ensure the slider is closed and pour grain in the cylinder at a constant rate until full to the top.

— Pull the sliding divider out and the weight will move down, drawing the grain down with it (you will hear it moving down).



— Once the weight D is at the bottom, replace the sliding divider back in the slot.

— Carefully tip the cylinder upside down and tip out all the grain remaining above the divider. Make sure to catch the weight D as it drops down.

— Place a plastic container on the electric balance and tare to read zero.

— Remove the blade from the chondrometer and tip the measured litre of grain into the plastic container and weigh.

— The weight is in grams and needs to be multiplied by 0.1 (divided by 10) to obtain a density in kg/hl.

— Always undertake analysis in duplicate and average results.

— Report the result to one (1) decimal place.

### G.6 References

ISO 7971-1, *Cereals — Determination of bulk density, called "mass per hectolitre" — Part 1: Reference method*



# Annex H
(informative)

## Test weight assessment: Franklin Mark 11 Chondrometer reference method

### H.1 Definitions

This is the Franklin Mark 11 Chondrometer reference method to determine the density of cereal grains (otherwise known as the Test Weight) expressed as kilograms per hectolitre.

### H.2 Scope

This method is applicable to all cereal grains.

### H.3 Apparatus

— Franklin Mark II Drop Weight Trade Certified chondrometer

— Pre filling Cup

### H.4 Reagents

Not applicable.

### H.5 Procedure

— Assemble the instrument together and place the calibration weight onto the top of the measuring cylinder.

— Place the measuring cylinder with weight on the hook at the end of the measuring beam.

— Calibrate the instrument by moving the sliding weight to the position corresponding to 40kg/hl on the measuring beam. The beam should balance equidistantly between the top and bottom of the square space at the other end of the beam.

— If the beam is not balanced, turn the calibration screw at the other end of the beam until the correct setting is achieved.

— Remove the calibration weight. The instrument is then calibrated.

— Insert the cutter bar into the bottom measuring cylinder, and place the drop weight on top of the cutter bar.

— Fit the top filling cylinder onto the measuring cylinder.

— Fill the pre-filling cup with grain. Sample to be “as is”.

— Steadily pour the grain from the pre-filling cup with one hand into the top filling cylinder until it is full whilst holding both cylinders together.

— Withdraw the cutter bar in a single swift motion.

— Re-insert the cutter in the slit and push it through the grain with a single firm stroke.

— Remove the top filling cylinder from the measuring cylinder and discard the grain remaining above the cutter, while holding the cutter in place.

— Remove the cutter and suspend the measuring container from the measuring beam of the chondrometer.



— Adjust the sliding weight on the beam until the instrument is balanced.

— Read the test weight of the graduated balance beam at the point indicated by the sliding weight and record the result in kilograms per hectolitre.

— Report the result to one (1) decimal place.

### H.6 References

ISO 7971-2, *Cereals — Determination of bulk density, called "mass per hectolitre" — Part 2: Routine method*

# Annex J
(informative)

## Test weight assessment: Kern 222 Chondrometer reference method

### J.1 Definition

This is the Kern 222 Trade Certified Chondrometer reference method to determine the density of cereal grains (otherwise known as the test weight) expressed as kilograms per hectolitre.

### J.2 Scope

This method is applicable to all cereal grains.

### J.3 Apparatus

— Kern 222 Trade Certified Chondrometer with valid Regulation 13 certificate.

— Electronic balance 0.01g resolution.

### J.4 Reagents

Not applicable

### J.5 Procedure

— Assemble the measuring container with the grain cutter inserted in the slit. Place the brass piston on top of the cutter blade. Connect the filling hopper securely on the top of the measuring container.

— Fill the pre-filling cup with grain. Grain sample to be “as is”.

— Empty the pre-filling cup out onto a large sample tray and manually remove any foreign material e.g. whiteheads, straw, barley, lupins, sticks stones etc.

— Pour the remaining grain from the sample tray back into the pre-filling cup. Ensure that the pre filler cup is filled up to or above the internal filling line/groove.

— Steadily pour the grain from the pre-filling cup into the filling hopper until the filling hopper is full.

— Grasp the measuring container firmly with one hand and with the other hand withdraw the cutter in a single swift motion.

— Re-insert the grain cutter in the slit and push it through the grain with a single firm stroke.

— Remove the filling hopper from the measuring container and discard the grain remaining above the cutter, while holding the cutter in place.

— Remove the cutter and return the base bucket to an upright position and then withdraw the cutter.

— Place the Steel Bowl onto the balance and press the T (Tare) button, ensure Zeros are displayed.

— Pour the grain from the bucket into the steel bowl.

— The weight in grams will appear on the display of the balance. This figure is referred to as the weight in grams per litre.

— All numerical results are to be written down to two decimal places.



### J.6 References

ISO 7971-2, *Cereals — Determination of bulk density, called "mass per hectolitre" — Part 2: Routine method*

# Annex K
(informative)

## Unmillable material assessment (screenings): Reference method

### K.1 Definition

This is the reference method used to determine the percentage by weight of Unmillable Material Below the Screen (Screenings), including Small Foreign Seeds.

### K.2 Scope

This method is applicable to barley.

### K.3 Apparatus

Agitator Shaking Device

Combination of two screens – top 2.50mm top screen and 2.20mm bottom screen with the following specifications:

— 300mm diameter discs x 0.8mm stainless steel, perforated with 25.40mm x 2.20mm slots, hit and miss on ends with 4.77mm end bar and 2.0mm side bar.

— 300mm diameter discs x 0.8mm stainless steel, perforated with 25.40mm x 2.50mm slots, hit and miss on ends with 4.77mm end bar and 2.0mm side bar.

— 2.20mm slot width as assessed by an Engineers Pin Gauge is to be 2.20 mm ± 0.01 mm. Pin Gauge, being 2.21mm and 2.19, needs to have a valid calibration certificate.

— 2.50mm slot width as assessed by an Engineers Pin Gauge is to be 2.50 mm ± 0.01 mm. Pin Gauge, being 2.51mm and 2.49, needs to have a valid calibration certificate.

— Compliance testing shall be undertaken by randomly selecting 74 slots and measuring using the above Gauge. 0 to 25 slots is an acceptable failure rate. Refer to separate procedure.

Analytical balance accurate to at least 0.01g

### K.4 Reagents

Not applicable.

### K.5 Procedure

— Obtain a certified half litre sample of grain. Sample to be “as is”.

— Place the barley screens on top of the Agitator platform with the slots aligned toward the front of the Agitator. Ensure the barley screen is clean, smooth, dry and free of grain residues in the slots.

— Ensure the Agitator is set to perform 40 to and fro movements over a period of approximately 68 seconds.

— Pour the half litre of grain in one movement onto the screen surface. No additional movement or spreading of the sample over the screen is to occur.

— Turn on the Agitator and allow it to run until the 40 movements have been completed.

— Gently remove the screens and pan from the Agitator and detach the screens from the pan.



— Calculate Screenings percentage — Weigh the contents of the pan on an appropriate top pan balance and calculate the percentage as follows:

$$\text{Screenings by wt (\%)} = \frac{\text{Screenings Weight}}{\text{Total weight}} \times 100$$

— Calculate small foreign seeds percentage - Separate any Small Foreign Seeds (SFS) as listed in the Definitions Section of these Standards from the Screenings fraction and weigh these separately.

$$\text{SFS by wt (\%)} = \frac{\text{SFS Weight}}{\text{Total Weight}} \times 100$$

— Report all results to the nearest 0.1%.

### K.6 References

ISO 5223, *Test sieves for cereals*

# Annex L
(informative)

## Retention: Reference method

### L.1 Definition

This is the reference method used to determine grain retained above the 2.50mm screen, referred to as Retention.

### L.2 Scope

This method is applicable to barley.

### L.3 Apparatus

Agitator Shaking Device

Combination of two screens – top 2.50mm top screen and 2.20mm bottom screen with the following specifications:

— 300mm diameter discs x 0.8mm stainless steel, perforated with 25.40mm x 2.50mm slots, hit and miss on ends with 4.77mm end bar and 2.0mm side bar.

— 300mm diameter discs x 0.8mm stainless steel, perforated with 25.40mm x 2.20mm slots, hit and miss on ends with 4.77mm end bar and 2.0mm side bar.

— 2.50mm slot width as assessed by an Engineers Pin Gauge is to be 2.50 mm ± 0.01 mm. Pin Gauge, being 2.51mm and 2.49, needs to have a valid Regulation 13 certificate.

— 2.20mm slot width as assessed by an Engineers Pin Gauge is to be 2.20 mm ± 0.01 mm. Pin Gauge, being 2.21mm and 2.19, needs to have a valid Regulation 13 certificate.

— Compliance testing shall be undertaken by randomly selecting 74 slots and measuring using the above Gauge. 0 to 25 slots is an acceptable failure rate. Refer to separate procedure.

Analytical balance accurate to at least 0.01g

### L.4 Reagents

Not applicable.

### L.5 Procedure

— Obtain a certified half litre sample of grain. Sample to be “as is”.

— Place the barley screens on top of the Agtator platform with the slots aligned toward the front of the Agtator. Ensure the barley screen is clean, smooth, dry and free of grain residues in the slots.

— Ensure the Agtator is set to perform 40 to and fro movements over a period of approximately 68 seconds.

— Pour the half litre of grain in one movement onto the screen surface. No additional movement or spreading of the sample over the screen is to occur.

— Turn on the Agtator and allow it to run until the 40 movements have been completed.

— Gently remove the screens and pan from the Agtator and detach the screens from the pan.



— Calculate Retention percentage — Weigh the grain remaining above the 2.50mm screen on an appropriate top pan balance and calculate the percentage as follows:

$$\text{Retention by wt (\%)} = \frac{\text{Grain above the 2.50mm screen}}{\text{Total Weight}} \times 100$$

— Report all results to the nearest 0.1%.

### L.6 References

ISO 5223, *Test sieves for cereals*

# Annex M
(informative)

## Falling number: Reference method

### M.1 Definitions

This is the reference method for determination of Falling Number and is based on the unique ability of alpha amylase to liquefy a starch gel. Strength of the enzyme is measured by Falling Number defined as the time in seconds required to stir plus the time it takes to allow the stirrer to fall a measured distance through a hot aqueous gel undergoing liquefaction.

### M.2 Scope

This method is applicable to barley.

### M.3 Apparatus

Perten Falling Number apparatus, including standardised precision viscometer tubes with close tolerances, inside diameter ± 0.02mm outside diameter ± 0.3mm length ± 0.3mm.

Thermometer, calibrated in 0.1 °C, and certified to ± 0.3 °C.

Sample Mill. Must produce meal with particle size distribution as follows; <500µm, 0-10%; >210 but <500µm, 25-40%; <210µm, 75-50%. The recommended instrument is the Perten 3100 Mill with 0.8mm sieve.

Automatic Pipette should be capable of delivering 25 ± 0.3ml.

Analytical balance accurate to at least 0.01g

### M.4 Reagents

Distilled water

### M.5 Method

— Start the Falling Number instrument by following the manufacturer's instructions. Ensure the bath is filled with distilled water and the instrument has reached full operating temperature before being used.

— Grind a minimum 250g sample of whole grain using the designated mill. Sample to be "as is".

— Weigh 7.00 ± 0.05 g of meal into a dry falling number tube.

— Add 25 ml of distilled water from the automatic dispenser. Insert a rubber stopper into the top of the tube and shake tube in an upright position 20-30 times (up and down) or more if necessary) until mixed. Make sure all flour is suspended by upending. Alternatively the unit may shake the tubes.

— Use the viscometer stirrer to scrape down the slurry coating the upper part of the tube, and scrape all slurry from the stopper.

— Place the tube and the viscometer stirrer into the water bath within 30 to 60 seconds after mixing. Start the Falling Number apparatus immediately afterward.

— At the conclusion of the test, record the time in seconds.



— Remove the tube and appropriately clean the stirrer, tube and stopper using cold water and brush. Distilled water may assist removal of all traces of the starch gel material. Clean the mill of all residues retained from the sample.

— Report the Falling Number value to the nearest second.

### M.6 References

ISO 3093, *Wheat, rye and respective flours, durum wheat and durum wheat semolina — Determination of the Falling Number according to Hagberg-Perten*

# Annex N
(informative)

## Rapid visco analyser: Reference method

### N.1 Definitions

This is the reference method for determination of RVA units and is based on the unique ability of alpha amylase to liquefy a starch gel. Strength of the enzyme is measured by RVA units defined as the time in seconds required to stir plus the time it takes to allow the stirrer to fall a measured distance through a hot aqueous gel undergoing liquefaction.

### N.2 Scope

This method is applicable to barley.

### N.3 Apparatus

Rapid ViscoTM Analyser apparatus, including one use RVA cups and paddles, as supplied by the manufacturer.

Sample Mill. Must produce meal with particle size distribution as follows; <500µm, 0-10%; >210 but <500µm, 25-40%; <210µm, 75-50%. The recommended instrument is the Perten 3100 Mill with 0.8mm sieve.

Automatic Pipette should be capable of delivering 25 ± 0.3ml.

Analytical balance accurate to at least 0.01g

### N.4 Reagents

Distilled water

### N.5 Method

— Start the RVA instrument by following the manufacturer's instructions. Ensure the instrument has reached full operating temperature before being used.

— Grind a minimum 300g sample of whole grain using the designated mill. Sample to be "as is".

NOTE: the RVA will read "_ _ _" until it reaches the measuring temperature.

— Measure 25.0 +/- 0.1 ml water (distilled or deionised) from the dispensette into a new canister.

— Accurately weigh 4.00g (+/- 0.01g) of ground grain into a weighing vessel.

— Transfer the entire weighed sample onto the water surface in the canister (not the other way around). The sample should not be added to the water until just before the test occurs otherwise erroneous results may occur.

— Place the paddle into the canister and vigorously jog the blade through the sample up and down 10 times. Repeat the jogging action if any lumps remain on the water surface or adhere to the paddle.

— Place the paddle into the canister and firmly insert the paddle into the RVA paddle coupling on the instrument.

NOTE: The paddle must be fully inserted into the coupling (firmly squeeze the front of the paddle against the back of the coupling) for proper functioning of the instrument.



— Make sure that the paddle turns freely in the canister and does not rub against the sides. If the paddle rubs it will give a higher than expected result.

— Initiate the measurement cycle by firmly depressing the blue motor tower of the instrument and immediately releasing it.

— On completion of the test, the tower will raise and the Stirring Number will be displayed at the front of the instrument. Record the Stirring number.

NOTE: The instrument will display time in seconds for the duration of the three-minute test and then display the Stirring Number at the completion of the test.

— Remove the canister with the insulating glove or tongs and discard.

CAUTION! The sample canister is hot at the end of the test.

### N.6 References

American Association of Cereal Chemists Method – Weather Damage in grain: AACC 22-08, ICC 161 and Royal Australian Chemical Institute Methos - RACI 05-05

# Annex P
(informative)

## Germinative energy: Reference method

### P.1 Definitions

This is the reference method for determination of the percentage of grains which can be expected to germinate fully if the sample is malted at the time of the test.

### P.2 Scope

This method is applicable to barley.

### P.3 Apparatus

Petri dishes, 90mm

Filter paper, white Whatman No.1, 85mm

Pipette 4 ml and 8 ml

Flat tray

Cellotape

Incubation chamber or germination cabinet (if available)

### P.4 Reagents

Distilled water

### P.5 Method

— Place two filter papers in the bottom of the petri dish and add precisely 4 ml of distilled water.

— Count 100 whole barley grains from the sample and place them on the paper so that each makes good contact.

— Cover the petri dish with its lid and ensure that loss of moisture is prevented by making a good seal using cellotape or other measure.

— Place the petri dish on a tray in a dark germination cabinet or incubator set at 19 °C or on the surface of a bench under similar temperature and lighting conditions. It is important that the petri dish or any tray it sits on is flat.

— At intervals of 24 hours and 48 hours from the beginning of the test, remove corns.

— Count the remaining barley grains that have not chitted after 48 hours.

— % Germinative Energy is calculated using the following formula = (100 – remaining unchitted grains).

— Report the results as a % rounded to the nearest whole number.

### P.6 References

IOB Methods of Analysis – 1.7 Germinative Energy of Barley (BRF Method) (EM) Issued January 1997.



# Annex Q
(informative)

## Germinative capacity rapid staining method: Reference method

### Q.1 Definitions

This is the reference method for determination of the percentage of living grains in a sample of barley using rapid staining.

### Q.2 Scope

This method is applicable to barley.

### Q.3 Apparatus

Scalpel or other apparatus for accurately sectioning grains longitudinally

Test tubes

Filter pump or source of air suction

Magnifying glass

### Q.4 Reagents

Distilled water

2,3,5-triphenyl tetrazolium chloride solution (10g/l). Follow the manufacturer's instructions on dilution. Store the solution in a dark bottle to exclude light.

### Q.5 Method

— Separate 100 barley grains. Exclude any foreign material and broken grains.

— Cut the grain longitudinally to bisect the embryo, discarding one set of half corns.

— Place the remaining half corns in a test tube and cover with the tetrazolium solution at room temperature.

— Evacuate the tube to below 200mm Hg for 3 to 4 minutes and re introduce air to force the solution into the grains.

— Maintain the test tubes at 40°C for 30 minutes in a water bath.

— Drain the grains.

— Spread the grains on moist filter paper and examine using magnification.

— Classify the grains into:

  — Completely coloured which are healthy living germs (X)

  — These which are damaged but sufficiently intact to germinate – as a minimum the shoot and scutellum together with a little of the tissue between the shoot and root are stained (Y)

  — Unstained germs or those less stained than the minimum described in Y above

— Calculate the germinative capacity using the following formula:



Germinative Capacity (%) = X +Y

— Report the results as a % rounded to the nearest whole number and state the method used in brackets e.g. GC = x% (stain)

**Q.6 References**

IOB Methods of Analysis – 1.6 Germinative Capacity of Barley: Rapid Staining Method (EM) Issued January 1997.

# Annex R
(informative)

## Defective grains assessment: Reference method

### R.1 Definitions

This describes the method of assessment of deliveries of barley for the various types of defective grains described in these barley Standards. The various defective grain types and their assessment methods are described in this method as follows:

| Count per 100 grains | Count per half litre | % by weight 100 grams | Count per entire load |
|---|---|---|---|
| Shot or Sprouted* | Insect Damaged | Broken | Heat Damaged, Bin Burnt or Storage Mould |
| Dark Tipped | | | |
| Field Fungi | | | |
| Skinnings | | | |
| Split or Cleaved | | | |
| Frost Damaged | | | |
| Dry Green or Sappy | | | |
| * For Shot or Sprouted grain, GTA Standards specify both a RVA minimum and a Falling Number minimum. Please refer to the procedure for determining whether a RVA test or a Falling Number test is required during the field evaluation process which is detailed separately. | | | |

### R.2 Scope

This method is applicable for all deliveries of barley.

### R.3 Apparatus

Visual Recognition Standards

A 100 grain tray or mechanism capable of holding 100 grains

### R.4 Reagents

Not applicable

### R.5 Method

— Sample to be “as is”.

— For Defective grains with tolerances above zero, assessment is made on grain from the Grower Load Composite sample.

— For nil tolerance defects, the tolerance (rejection of the load) can apply if the defect is detected at any stage of the delivery or testing process, including in the truckload before sampling, in the probe sample, in the half litre sample or during discharge into the receival hopper after assessment.

— Grain should be examined for defects under conditions of good lighting. Instruments of magnification may be used to assist the determination of the level of visually defective grains present in the sample.

— For those defects with a tolerance based on count in a 100 grain sample, a small sub sample should be drawn from the Grower Load Composite sample and placed on the 100 grain tray. Surplus grain should be removed from the tray when all 100 holes have been filled. Count the number of grains for the defect in question.

— For those defects with a tolerance based on the number of grains in a half litre sample (Insect Damaged), the entire half litre sample is to be assessed. Count the number of grains for the defect in question.

— For those defects with a tolerance based on % by weight in a 100 gram sample (Broken), a representative 100 gram sub sample should be drawn from the Grower Load Composite sample. Remove all Broken grain from the 100 gram sample and weigh.

— Each grain should be examined to determine if it is classified as defective. Note one kernel may have more than one defect. Each defect type present on the grain is required to be counted.

— The presence and level of defective grains can be assessed with the assistance of the GTA Approved photographic standards listed in Section 6 or objective measurement instruments where appropriate (refer for example Falling Number or Rapid Visco Analyser Reference Methods in Section 5).

— Report all applicable results to the nearest 0.1% or nearest whole number per half litre whichever is applicable.

### R.6 References

ISO 605:1991, *Pulses — Determination of impurities, size, foreign odours, insects, and species and variety — Test methods*



# Annex S
(informative)

## Contaminants assessment: Reference method

### S.1 Definitions

This describes the method of assessment of deliveries of barley for the various types of Contaminants described in these barley Standards. The various contaminant types and their assessment methods are described in this method as follows:

| Length in cm per half litre | Count per half litre | % by Count | % by weight in half litre | Count per entire load |
|---|---|---|---|---|
| Ryegrass Ergot | All Weed Seed Types except 2 and 6* | Varietal Purity | Small Foreign Seeds | Type 2 weed seeds |
| | Coloured Aleurone Layer* | | Foreign Material | Type 6* weed seeds |
| | Stored Grain Insects and Pea Weevil - Dead | | | Coloured Aleurone Layer* |
| | Field Insects Sitona Weevil – Live or Dead | | | Cereal Ergot |
| | Field Insects All Others – Live or Dead | | | Smut – Ball & Covered |
| | Snails | | | Stored Grain Insects and Pea Weevil - Live |
| | Sand | | | Objectionable Material |
| | Earth | | | Stones |
| | Wild Oats / Wild Radish | | | Pickling Compounds |
| **Weight in gram per half litre** | Wheat, Cereal Rye, Triticale, Cultivated Oats, Rice (Foreign Grain) | | | Chemicals not Approved for Barley |
| Loose Smut | Six row barley | | | Foreign Seed Pods |
| | | | | Barley Not of the Current Season |
| *Note – Type 6 weed seeds and Coloured Aleurone Layer are to be counted per half litre or per the entire load, depending on the grade | | | | |

### S.2 Scope

This method is applicable for all deliveries of barley.

### S.3 Apparatus

Combination of two screens – top 2.50mm top screen and 2.20mm bottom screen with the following specifications:

— 300mm diameter discs x 0.8mm stainless steel, perforated with 25.40mm x 2.50mm slots, hit and miss on ends with 4.77mm end bar and 2.0mm side bar.

— 300mm diameter discs x 0.8mm stainless steel, perforated with 25.40mm x 2.20mm slots, hit and miss on ends with 4.77mm end bar and 2.0mm side bar.

— 2.50mm slot width as assessed by an Engineers Pin Gauge is to be 2.50 mm ± 0.01 mm. Pin Gauge, being 2.51mm and 2.49, needs to have a valid calibration certificate.

— 2.20mm slot width as assessed by an Engineers Pin Gauge is to be 2.20 mm ± 0.01 mm. Pin Gauge, being 2.21mm and 2.19, needs to have a valid calibration certificate.

— Compliance testing shall be undertaken by randomly selecting 74 slots and measuring using the above Gauge. 0 to 25 slots is an acceptable failure rate. Refer to separate procedure.

Analytical balance accurate to at least 0.01g

— Visual Recognition Standards

Mesh Screen (optional)

### S.4 Reagents

Not applicable.

### S.5 Method

— Sample to be “as is”.

— For contaminants with tolerances above zero, assessment is made on the entire half litre sample on grain above and below the 2.50 mm and 2.20mm screens after the Unmillable Material assessment (Screenings) has been conducted.

— For nil tolerance contaminants, the tolerance (rejection of the load) may apply if the contaminant is detected at any stage of the delivery or testing process, including in the truckload before sampling, in the probe sample, in the half litre sample or during discharge into the receival hopper after assessment.

— Following sieving, the grain remaining on the top of all screens and in the bottom pan should be examined under conditions of good lighting. There is no time restriction for this assessment. If contaminants are found, they shall be removed by hand and assessed in accordance with the tolerance prescribed in these Standards under 9.18.1.

— Seed contaminants are to be assessed using the appropriate visual assessment method and in accordance with the tolerance prescribed in these Standards under 9.18.1.

— Small Foreign Seeds (SFS) are assessed in the bottom tray (catchpan). These may need to be physically removed from all non-SFS material in the bottom tray. Alternatively, to assist in separating SFS from non-SFS material in the bottom tray, a mesh screen may be used. Place the sample over the mesh screen over a white tray and gentle shake. SFS tend to remain on top of the mesh screen. Physical hand separation of SFS may still be required using this method.

— Seed Pods are to be assessed as a count per half litre where greater than 5mm in diameter. Where seed pods are not listed in the Standards and are 5mm or less in diameter, they are to be measured as part of Foreign Material. Any seed pods detected must not be opened. Pods refers to whole pods or part thereof.

— Where reference material is not available, other contaminants should be assessed by reference to the Definitions of those parameters.

— For assessment of pickling compounds and chemicals not approved for grain, all deliveries are to be accompanied by a signed declaration referring to its chemical status. Where the receiving agent believes that the visual appearance and/or odour of grain suggests that it has been treated with a non approved chemical, the grain is not to be received until the representative “as received” sample has been tested by an approved independent laboratory and the presence or absence of non approved chemicals ascertained.



— Report results as follows:

Count per half litre – nearest whole number
Length in cm per half litre – nearest 0.1cm
Percentage by wt per half litre – nearest 0.1%
Percentage by count per half litre – nearest 1%
Weight in grams per half litre – nearest 0.1g

### S.6 References

ISO 605:1991, *Pulses — Determination of impurities, size, foreign odours, insects, and species and variety — Test methods*

# Annex T
(informative )

## Varietal declaration procedure

### T.1 Definitions

This is the recommended procedure for determining the variety of the load presented for delivery.

### T.2 Scope

This procedure is applicable to all barley deliveries.

### T.3 Apparatus

Not applicable.

### T.4 Reagents

Not applicable.

### T.5 Method

For the purposes of this Standard and delivery of grain, classification is dependant on the segregations available at the point of delivery and the highest grade classification available for that variety.

— Deliverer declares the variety(s) in the load tendered for delivery. It is recommended that the grower signs a Declaration Form and provide this to the deliverer for provision to the Receival Agent. This Declaration Form should at a minimum contain the grower details and the variety(s) of the load.

— If the declared varietal composition or paddock where the grain was grown is different for each unit tendered for delivery, or more than one variety is commingled in each delivery unit, then a separate assessment of each unit must be conducted.

— Note that depending on the varietal declaration and the procedures of the Receival Agent, a sample of the load may be taken and sent to a laboratory for assessment of the variety within the sample. In this instance sample is to be “as is”.

— Report the variety as per the following procedure using the applicable code as defined by the Receival Agent.

**Load is declared as one variety only**

— Where the load is declared as being of the one variety only, review the applicable maximum grade classification of that variety.

— Based on the quality results, grade the load and record the declared variety.

**Load is declared as multiple varieties of the same grade classification status**

**Malt varieties:**

— Where the load is declared as being of more than the one variety, unless the Varietal Purity specifications of minimum 95% can be met, the load cannot be classified as a malt grade. If the Varietal Purity specifications have been met for the malt grades, it is recommended the Receival Agent implement some form of varietal purity testing.



— Based on the quality results, grade the load and record the variety with the greatest percentage in the load (i.e., the variety that was nominated to meet the Varietal Purity specifications).

**Feed varieties:**

— Where the load is declared as being of more than the one feed variety, the load can only be classified as a feed grade

— Based on the quality results, grade the load and record the variety with the greatest percentage in the load

**Load is declared as multiple varieties of different grade classification status**

— Where the load is declared as containing one or more of a malt and a feed variety, the load can only be classified as a malt grade if the varietal purity minimum of 95% is met.

— Based on the quality results, grade the load and record the variety with the greatest percentage in the load.

### T.6 References

ISO 605:1991, *Pulses — Determination of impurities, size, foreign odours, insects, and species and variety — Test methods*

# Annex U
(informative)

## Screen slot size compliance procedure

### U.1 Definition

This is the recommended procedure for determining whether the screen slot size complies with the Standard and relevant legislation.

### U.2 Scope

This procedure is applicable to all barley deliveries and screens used for assessment purposes.

### U.3 Apparatus

Engineers Pin Gauge, 2.19mm and 2.21mm, with a valid calibration certificate

Engineers Pin Gauge, 2.49mm and 2.51mm, with a valid calibration certificate

Checking template (if available)

Calibration sticker

### U.4 Reagents

Not applicable.

### U.5 Method

— Compliance testing shall be undertaken by randomly selecting 74 slots and measuring using the above Gauges.

— Place screen or disc with the smooth surface up so that it sits horizontally.

— Examine the screen for any damage to the slots. If there is any damage affecting the accuracy of the slots or the screen immediately reject the screen.

— Ensure the screen is labelled with the correct slot/hole size, the commodity that is normally tested on the screen (barley) and the screen identification number.

— For screen accuracy, place relevant checking template (testing 74 slots) centred as much as possible (use the handle as a guide) on top of screen and rotate so that all the holes line up. For discs place the disc on top of relevant checking template, rotate disc until all the holes line up then clamp with bulldog clips.

— Select the appropriate GO/NO GO GAUGE for the screen/disk to be tested i.e., for barley, the barley gauges are 2.19 – 2.21 (2.20mm) and 2.49 – 2.51 (2.50mm).

— Hold the GO/NO GO GAUGE in the middle.

— Place an end of the GO/NO GO GAUGE on the middle of a slot which lines up with a slot on the template so that is perpendicular to the slot.

— Release the GO/NO GO GAUGE. Gauges are not to be pushed through slots.

— If the GREEN (GO) end does not go through then the slot fails. Record this event and move on to the next slot.



— If the GREEN (GO) end does go through then the slot size is greater than the nominated size of the GREEN end. Proceed to test the slot with the RED (NO GO) end as follows:

— If the RED (NO GO) end does not go through then the slot size is less than the nominated size of the RED end and greater than the nominated size of the Green End, hence the slot is within the accepted range and passes.

— If the RED (NO GO) end does go through then the slot fails. Record this event and move on to the next slot.

— Proceed to test all 74 slots, recording each failure.

— Repeat the above process for both screens i.e., the 2.50mm and 2.20mm screen.

— 0 to 25 slots is an acceptable failure rate.

— If the screen meets the tolerances:

— Record results on the equipment record

— Affix the relevant calibration sticker to the side of the sieve (not the catch pan)

### U.6 References

Not applicable.

## Bibliography

*Ullrich, S.E., editor. (2011) Barley: Production, Improvement, and Uses [Internet]. Wiley-Blackwell, Chichester, West Sussex, UK; Ames, Iowa, USA*