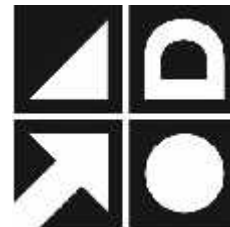


FINAL MAGNETIC SEPARATION DEVICES for REMOVING FERROMAGNETIC and WEAKLY FERROMAGNETIC PARTICLES from FOOD PRODUCT STREAMS



HACCP International Food Safety Standard

0909MAGSEP 1-2010

Foreword

This standard was developed under procedures which meet the criteria for Australian National Standards. The consensus committee that approved the standard was organized so that competent individuals from interested parties had an opportunity to participate. The following interests were represented on the consensus committee:

Manufacturers of magnetic separation devices
Food manufacturers
Food safety experts
Food safety auditors
Australian Restaurant and Catering Association

It was developed within the approved scope as stated in Clause 1 of the standard.

The objective of this standard is to provide manufacturers, suppliers and purchasers of magnetic separation devices with requirements that will ensure that the devices are best practice with respect to food safety. Devices which meet these requirements are suitable for use in food facilities which operate in accordance with a HACCP based food safety programme.

The technical committee that developed this standard recognizes that new developments are to be expected and revisions of the standards are necessary as new products are developed and further experience is gained.

HACCP International Standards are developed and maintained with the intent to represent the consensus of concerned interests. As such, this Standard is available for public review on a continuing basis. This provides an opportunity for additional public input from industry, academia, regulatory agencies, and the public-at-large.

Users of this Standard may interact with the Committee by requesting interpretations, proposing revisions, and attending Committee meetings. Correspondence should be addressed to:

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Table of Contents

1	Purpose and Scope	2
2	References	2
3	Definitions	3
3.1	Magnetic Separation Devices	3
3.2	Final Magnetic Separation Devices	3
3.3	Ferromagnetic Particles	3
3.4	Weakly ferromagnetic Particles	3
3.5	Food.....	3
3.6	Food Product Stream.....	3
3.7	Food Zone	3
3.8	Splash Zone.....	3
3.9	Non- food zone	4
3.10	Pole Spacing	4
3.11	Approved Gauss Meter.....	4
3.12	Pole Plate Thickness	4
4	Materials	4
4.1	Food Zone Components:	4
4.1.1	General	4
4.1.2	Metal Materials	4
4.1.3	Non metal materials	4
4.1.4	Coatings	5
4.1.5	Lubrication.....	5
4.2	Splash Zone Components:	5
5	Sanitary Design.....	5
5.1	General Requirements for Sanitary Design	5
5.2	Surfaces in the food zone	5
5.3	Joints within the food zone.....	5
5.4	Angles and corners in the food zone:.....	6
5.5	Fasteners:.....	6
5.6	Requirements for sanitary design, non-food zone:	6
6	Magnet specifications	6
6.1	Magnet types	6
6.2	Plate Magnets.....	7
6.3	Bar Magnets	7
7	Coverage of Product Stream	8
8	Cleaning Methods.....	8
9	Operations Manual.....	8
	Annex A.....	9

1 Purpose and Scope

This standard describes the minimum requirements for final magnetic separation devices which are used to remove magnetic and weakly ferromagnetic particles from food product streams.

2 References

USA Food and Drug Administration Code of Federal Regulations, Title 21 (CFR 21).

3 Definitions

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

3.1 Magnetic Separation Devices

A device which uses a magnetic field to attract, separate and capture ferromagnetic particles considered as contamination from a non-ferromagnetic material.

3.2 Final Magnetic Separation Devices

Final magnetic separation devices are magnetic separation devices which are designed to be installed at the last possible point in a food handling process. This will be immediately preceding a process step which will render it un-flowable or immediately before the packaging process.

3.3 Ferromagnetic Particles

Particles, whose composition provides for a force to be applied to the particle when subjected to a magnetic field.

3.4 Weakly ferromagnetic Particles

Weakly ferromagnetic particles are particles which, when placed at a distance of 10 mm or less from the surface of the source of a magnetic field, are capable of accelerating with a force greater than G , when the strength of the magnetic field is 10,000 gauss at the surface of the source of the magnet field.

These may include work-hardened stainless steel fragments, magnetic stones, small diameter stainless steel wire pieces, stainless steel scrapings and fine magnetic oxides. Weakly magnetic particles are often of type and size which will not trigger industrial metal detectors validated by sized test pieces of 3 mm stainless steel and 1 mm ferrous spheres.

3.5 Food

In this standard, food products include, but are not limited to human foods, beverages, animal feed, food ingredients, agricultural products for use in human or animal feed.

3.6 Food Product Stream

A food product stream is a food product of a liquid or particulate nature, which is moving continuously through a pipeline or aperture, or along a conveyor.

3.7 Food Zone

The food zone includes all parts of the device which could come into contact with food in the product stream, including parts of the device which food will contact and then splash, drip or fall to rejoin the product stream.

3.8 Splash Zone

The splash zone includes all parts of the device which could come into contact with spilled or splashed food which will not re-enter the product stream.

3.9 Non- food zone

The non-food zones are the parts of the device which do not come into direct contact with food.

3.10 Pole Spacing

Pole spacing is the minimum straight line distance between the pole centres of two adjacent magnets within a set of magnets organised in repulsion measured along the length of a bar.

3.11 Approved Gauss Meter

An approved gauss meter is an instrument for the measurement of magnetic flux measured in the cgs (centimetre, gram, second) units 'Gauss', and having a transverse tip. The instrument shall have a calibration certificate less than 12 months old traceable to a National Measurement Institute certified organisation. In addition, the calibrated instrument is to be checked against a calibrated standard magnet immediately prior to magnet validations and be found to yield a variation of less than 3% of the known value of the standard magnet. The standard magnet will have a calibration certificate not more than 24 months old.

3.12 Pole Plate Thickness

Pole plate thickness is the edge width of pole plates inserted between the opposing poles of magnetic material within a bar magnet. Refer to Figure 1.

4 Materials

4.1 Food Zone Components:

4.1.1 General

Food zone components are parts of the magnetic separation device which could come into contact with the food product stream, including finishes, coatings, tubing, gaskets and sealants.

The parts of the magnetic separation device which will come into contact with the food product stream shall be composed of materials that are generally recognised as safe (GRAS) or have received prior sanction for their intended use as food contact materials, according to the requirements described below. They shall be non-contaminating, corrosion resistant and non-absorbent.

4.1.2 Metal Materials

Metals used in the food zone shall be stainless steel with a minimum chromium content of 16%.

4.1.3 Non metal materials

Materials used for other components in the food zone such as tubing, gaskets and non-metallic sealants shall comply with the provisions of the US Code of Federal Regulations, Title 21, sections 174 to 189.

4.1.4 Coatings

Coatings used in the food zone shall not be metallic. Paint is not permitted. Non-metallic food zone coatings shall comply with the requirements of the US Code of Federal Regulations, Title 21, sections 174 to 189. Coatings shall have abrasion resistance, heat resistance, impact resistance and adhesion ability appropriate to the intended usage application such that the coating will not be a source of contamination during normal use.

4.1.5 Lubrication

Where chemical lubrication is required, the specified lubricant shall be food grade.

4.2 Splash Zone Components:

Materials in the splash zone shall be non-contaminating, corrosion resistant and non-absorbent.

5 Sanitary Design

5.1 General Requirements for Sanitary Design

All surfaces shall be smooth and easily cleanable. There shall be no cracks, porosity, corrosion, swelling or damage to the magnet or housing surface.

Ball or roller bearings are not permitted within the food zone.

Where dismantling is required for cleaning or maintenance, the design should be such that minimal tools are needed. If any are needed, they should be captive or restrained at the site to eliminate risk of entering product stream. Non captive housing fasteners such as wing nuts shall not be used.

Where applicable, particularly for magnets installed in liquid product streams, magnets shall be adequately sealed against ingress from pressurized liquid and gases.

Magnets shall have a certified temperature of at least 120% of the maximum service temperature, CIP or manual magnet cleaning temperatures which could occur.

5.2 Surfaces in the food zone

Surfaces in the food zone shall have a certified profile roughness parameter of no greater than 1.0 μm R_a .

Housing drawer slides or guides forming a ledge which could retain product are not permitted in the food zone.

5.3 Joints within the food zone

Welding is the only permitted method for permanent joining of surfaces in the food zone. All welds shall be continuous, smooth and polished, de-burred, free of cracks, pits and corrosion. Stitch welds, spot welds and overlap welds are not permitted. In liquid applications involving pressure, sanitary or purge welding by a qualified pressure welder is a requirement and a pressure test certificate shall be furnished with the equipment supplied. The test pressure shall be at least twice the maximum operating pressure.

Where joints are to be routinely or regularly dismantled, surfaces shall tighten flush. Where non permanent joints are in the food zone for longer periods an approved food grade sealant shall be used.

5.4 Angles and corners in the food zone:

All permanent internal angles or corners of less than 135 degrees shall be rounded to provide a smooth, cleanable surface. The corner shall be rounded such that the radius shall be not less than 3 mm at the intersection of two planes. At the intersection of three planes, resulting in three angles, the radii for two of the angles shall be not less than 3 mm and for the third angle, not less than 6 mm.

Permanent external angles and corners shall be sealed and smooth

5.5 Fasteners:

Recessed fasteners, exposed threads, rivets or nuts are not permitted in the food zone or the splash zone.

Entry ports for magnets in powder and liquid lines should be BSM Flat Face Seal, RJT NZ Seal, Tri-Clover type fittings or equivalent with food grade gaskets and be appropriate for the material handled. Preferably gaskets should be of magnetic and metal-detectable materials. BSP screwed fittings shall not be used.

5.6 Requirements for sanitary design, non-food zone:

Legs, bracing and supports shall be open, and mounted with the internal angle facing downward or out to the side, or solid. Solid legs support or bracing shall be free of open holes, ends or cracks.

Equipment shall sit at least 150 mm from the floor to facilitate cleaning.

Control panels, sensors, gauges shall be shatterproof and easily cleanable. Control boxes shall have sloping cleanable tops. Hinges shall be easily cleanable. Control boxes shall have an IP rating of IP65 or greater.

6 Magnet specifications

6.1 Magnet types

Bare magnets, electromagnets and sleeve-type magnets are not permitted.

6.2 Plate Magnets

Plate magnets are permitted only when located underneath product flows.

Plate magnets shall incorporate a section designed to retain fragments. The fragment retention portion shall have a strength of at least 8,000 Gauss as measured by an approved gauss meter within the preceding 12 months and according to the requirements for testing described in Annex A.

6.3 Bar Magnets

Bar magnets may be arranged in grate configurations, as well as multiple fingers or single units or probes. In multiple bar or grate configurations, the bars shall be arranged so that the bars themselves are in repulsion to each other.

Bar magnets shall be encased in stainless steel tubes, having a bar diameter of 18 mm to 65 mm.

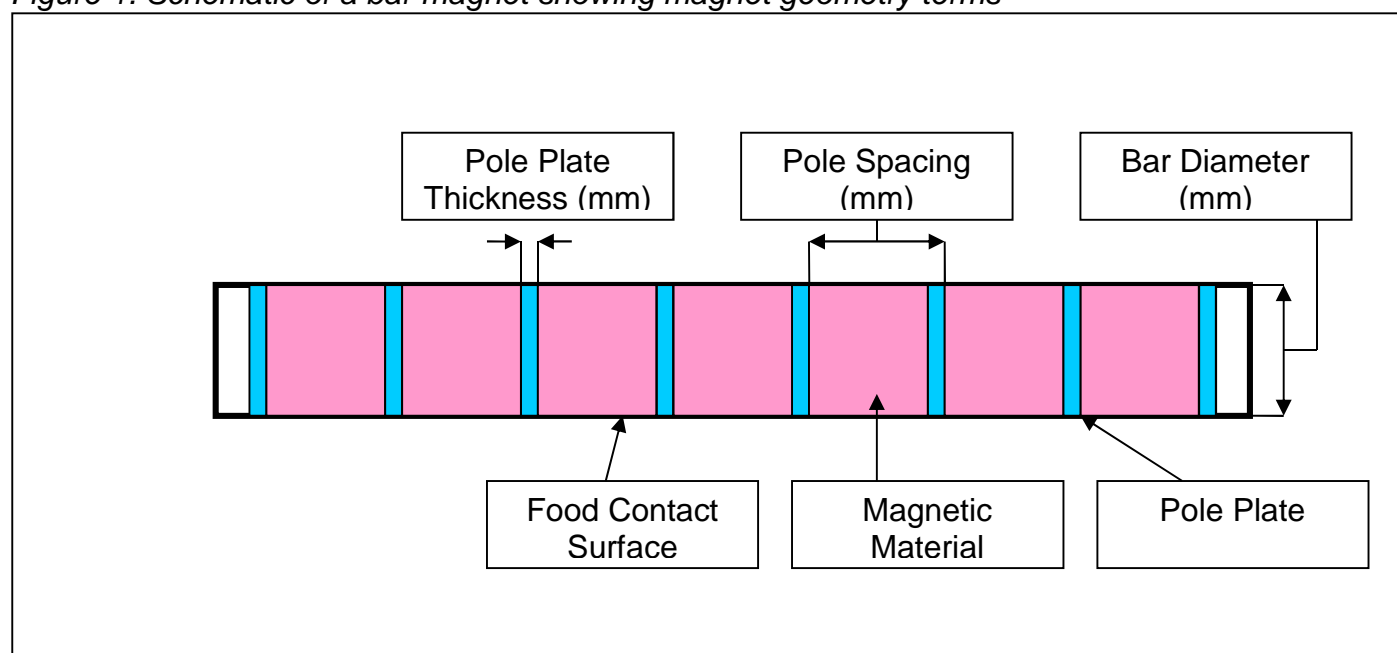
Due to the degradation of magnets over time, new magnets should be supplied with a strength of at least 10,000 Gauss at the food contact surface.

In operation, magnet strength shall be a minimum of 8,500 Gauss at the food contact surface, as measured by an approved gauss meter within the preceding 12 months and according to the requirements for testing described in Annex A .

Pole spacing shall be less than 23 mm for magnet bars of diameter 18 mm to 35 mm. For magnet bars with a diameter of 35 mm to 65 mm, the pole spacing shall be between 22 mm and 32 mm. Pole spacing shall be no greater than 32 mm for magnet bars of greater than 35 mm diameter.

Pole plate thickness shall be a minimum of 2 mm.

Figure 1. Schematic of a bar magnet showing magnet geometry terms



7 Coverage of Product Stream

Bar magnets shall be arranged such that they will be transverse to the product flow.

Coverage is the proportion by volume of the product contrived to contact the magnetic surface or pass within 10 mm of the magnetic surface without causing blockages.

The design and sizing of the magnetic separation device shall be such to provide a minimum of 80% magnetic coverage of the product stream to allow for capture of weakly ferromagnetic particles.

8 Cleaning Methods

The magnetic separation device shall be designed so that removal of captured ferromagnetic particles can be done in such a way as to avoid contamination of the product stream, minimise hand contact and should reduce the potential for unsafe lifting.

9 Operations Manual

An operations manual shall be supplied with every magnetic separation device. The operations manual shall include appropriate operator health and safety warnings and a description of cleaning methods and protocols.

Cleaning protocols shall recommend that operators not allow magnetic build-up beyond a thickness 1 mm of fines on up to 50% of the magnetic surface.

The operation manual shall define final magnets, and explain that final magnets shall be installed in the correct position in a processing line in order to provide adequate protection to food products. The operation manual shall specify that final magnets be installed upstream of metal detectors and X-Ray equipment and downstream of pumps, augers or other machinery which could generate or proliferate ferromagnetic particles.

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ANNEX A – Requirements for Determination of Magnet Strength

Determination of magnet strength shall be made using an approved gauss meter. In the case of multiple bar arrangements, each bar shall be treated as an individual magnetic device for the purpose of this method. At least five measurements shall be taken on each magnetic separation device or bar. Measurements shall be taken on the surface above each pole plate along the length of the bar excluding the plates at the end of the magnet array. The individual value obtained is the maximum gauss observed for each reading. Any single measurement which varies from the other measurements by more than 20% shall be disregarded and repeated. The measurements shall be averaged to provide an overall strength for the magnetic device or bar.

The records for magnet strength determination shall include all of the measurements taken, along with the serial number and the calibration certificate number of the gauss meter used for the measurements.