RECOMMENDATION
FROM THE
WORKING GROUP FOR MACHINES AND EQUIPMENT
IN THE CONFECTIONERY INDUSTRY

Foreign Matters in Confectionery Products

Technical methods to avoid foreign matters in sweets

APRIL 2000

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1. Introduction

Possible presence of foreign matters always poses a problem in the industrial production of food. This problem also exists in the confectionery industry.

For consumer protection, avoiding the presence of foreign matters in sweets has top priority. However, machines and plants shall be protected against damages as well.

2. Purpose and Range of Application

This recommendation shall provide information for manufacturers of confectionery products, their suppliers and producers of plants and equipment on how to avoid foreign matters in the production process and the final product.

The information refers to physical solid bodies which are not part of the formulation. This also includes agglomerates or other solid matters (burnt-on residues, caramelized solids) unintentionally formed in the production process which can be detected organoleptically.

Technical auxiliaries, among them lubricants (mineral oils, grease), cooling agents, water, detergents etc. pose another contamination risk. In general, these substances are not present in solid form and thus not included in the recommendation presented here.

In compiling this recommendation, due care was taken to consider preventive measures as well as detection and removal of foreign objects.

The information provided is based on valid legal and other regulations. However, this does not release the machines suppliers or operators from their due diligence and responsibility for their products. In some cases, measures might to be conducted reaching far beyond the scope of this recommendation.

The recommendation was compiled based on today's technical knowledge. No liability can be accepted. At least some parts of this recommendation might become invalid due to further developments, findings, modified or new laws and regulations.

3. Definition of Terms

TERM	EXPLANATION
Detection	Non-destroying detection of foreign matters in raw materials, semi-finished goods or products.
Foreign matter	Physical foreign objects which are not part of the formulation and can be detected organoleptically. Foreign matters can either migrate externally into the product or be caused by insufficient process management.
Prevention	All preventive measures for avoiding the presence of foreign matters in raw materials, semi-finished goods or products as well as excluding the formation of foreign matters in the production process.
Product zone	All areas where a food is being processed, handled or stored and all surfaces coming into contact with the food.
Product-free zone	All areas not coming into contact with the product or parts thereof.
Sensory evaluation	Examination of the perceptible characteristics of a product by using human senses (seeing, smelling, tasting, feeling, hearing).
Splash zone	All areas outside the product zone where residues might collect which can no longer be used for food production.

4. Examples of Foreign Matters and Possible Prevention Measures

FOREIGN MATTERS	EXAMPLES	PREVENTIVE MEASURES (examples)
1. Metals - nonferrous heavy metals - precious metals - iron, magnetic - iron, non-magnetic - light alloy - heavy metals	electric cable drilling chips screws nuts	Cover production equipment prior to any maintenance or repair work and clean complete plant after completion of works. Never conduct any repair works while the equipment is operating.
2. Glass	glass fragments	Do not allows glass objects (e.g. bottles, beakers, mirrors) in the production area. Install covers and shatter protection.
3. Mineral matters	rocks ceramics porcelain	In case of construction works, install dust separating walls. Systematic control of inside walls, ceramic elements, etc. (e.g. IR radiators).
4. Rubber, plastics, films and foils	cutting residues from blister foils	Supplier audits and respective contractual agreements. Keep inspection and maintenance intervals.
5. Wood, paper, cardboard	pieces from boxes or pallets, tools, packing means	Avoid use of wooden material, paper bags and cardboard containers in the areas where products are not protected.
6. Textiles and fibers	ropes, fabric pieces	Avoid jute bags in production areas.
7. Hairs and fingernails		Wear suitable headgear, no artificial fingernails.
8. Pest	rodents insects	Keep outside doors closed, protect windows with screens, develop pest control concept.
9. Plants and fruit pieces	peel, kernels, pits, fruit pulp	Optimum maintenance and adjustment of sorting plants.
10. Surface coatings	lacquers, plastics, metal oxides, ceramics	Avoid lacquering the product zone of machines and equipment.
11. Tobacco, food	cigarette end	Smoking and eating is prohibited in production areas.
12. Adhesive tapes		Use metallized adhesive tapes.
13. Jewelry, watches	rings, necklaces	No watches/jewelry to be worn in production areas.
14. Product-inherent solid bodies	agglomerates caramel, grit, burnt-on residues	Proper compliance with formulations and production methods.

5.0 Methods and their Limitations

Sieving methods	**Separation by particle size**
• *Static screens*	free-flowing and liquid media of low viscosity
• *Vibrating screens*	free-flowing and liquid media of low to medium viscosity
• *Centrifugal screens*	liquid media
• *Drum screens*	free-flowing and liquid media
Filtration methods	**Separation by particle size**
• *Static filters (basket/edge filter)*	liquid media of low to medium viscosity
• *Centrifugal filters*	liquid media with low to higher viscosity
• *Decanters*	separation with applied pressure
Sifting	**Separation by particle weight** (often applied in combination with sieving methods)
• *Air separation*	free-flowing media - separation in air current
• *Rock catcher*	free-flowing media - separation by gravity
Magnetic Separator	**Separation of magnetizing materials** (from slowly moving product flow with low layer thickness)
• *Permanent magnets*	free-flowing and liquid media of low viscosity (sensitive to heating, impacts and oversaturation)
• *Electromagnets*	free-flowing and liquid media of low viscosity (degree of effiziency/performance adjustable)
Metalldetectors	**Recognition of metallic contaminations**
• *Inductive methods*	liquid to solid media, also packed finished goods (different sensitivity for different metals)

Optical Recognition Systems	**Recognition of misshaped or discolored products**
Photocells	free-flowing and particulate media (detection of discolor and large contaminants)
Infra-red	free-flowing and particulate media (detection of large contaminants in raw materials)
Camera	free-flowing, particulate and clear liquid media (mainly detection of color deviations)
Laser	free-flowing and particulate media (mainly detection of deviations in shape, surface or color)
Transillumination methods	**Detection of contaminants with deviating density** in liquid, pasty, free-flowing and solid media (also in packed products)
Ultrasound methods	**Detection of contaminants with deviating surface hardness** in liquid, pasty, free-flowing and solid media
Manual sorting	**Visual recognition** separation of contaminants with deviating color or shape by inspectors free-flowing and particulate media with high separation effort (performance limited due to decreasing concentration)

Often some of the methods are combined for better results.

5.1 Application ranges for different methods

Foreign matters	Method	Sieving				Sifting				Filtration				Magnetic separation				Metal detector				Optical recognition				Trans-illumination				Ultra sound				Manual sorting			
	Product	liquid	pasty	free-flowing	solid, particul.	liquid	pasty	free-flowing	solid, particul.	liquid	pasty	free-flowing	solid, particul.	liquid	pasty	free-flowing	solid, particul.	liquid	pasty	free-flowing	solid, particul.	liquid	pasty	free-flowing	solid, particul.	liquid	pasty	free-flowing	solid, particul.	liquid	pasty	free-flowing	solid, particul.	liquid	pasty	free-flowing	solid, particul.
1.1 Magnetic metals		+	-	o*	-	-	-	o*	-	+	+	-	-	+	-	+	o	+	+	+	+	+	-	o*	o*	+	+	+	+	o“	o“	+“	+“	-	-	o*	o*
1.2 Non-magnetic metals		+	-	o*	-	-	-	o*	-	+	+	-	-	-	-	-	-	o*	o*	o*	o*	+	-	o*	o*	+	+	+	+	o“	o“	+“	+“	-	-	o*	o*
2. Glass		+	-	o*	-	-	-	o*	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	o*	o*	+	+	+	+	o“	o“	+“	+“	-	-	o*	o*
3. Minerals (e.g. rocks)		+	-	o*	-	-	-	o*	-	+	+	-	-	-	-	-	-	-	-	-	-	o*	-	o*	o*	+	+	+	+	o“	o“	+“	+“	-	-	o*	o*
4. Rubber, plastics		+	-	o*	-	-	-	o*	o*	+	+	-	-	-	-	-	-	-	-	-	-	o*	-	o*	o*	-	-	-	-	-	-	-	-	-	-	o*	o*
5. Wood, paper, cardboard		+	-	o*	-	-	-	o*	o*	+	+	-	-	-	-	-	-	-	-	-	-	o*	-	o*	o*	-	-	-	-	-	-	-	-	-	-	o*	o*
6. Textiles, fibers		+	-	o*	-	-	-	o*	o*	+	o*	-	-	-	-	-	-	-	-	-	-	o*	-	o*	o*	-	-	-	-	-	-	-	-	-	-	o*	o*
7. Hair, fingernails		+	-	o*	-	-	-	o*	o*	+	o*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8. Pest		+	-	o*	-	-	-	o*	o*	+	o*	-	-	-	-	-	-	-	-	-	-	o*	-	o*	o*	o	o	o	o	-	-	-	-	-	-	o*	o
9. Plant/fruit components		+	-	o*	-	-	-	o*	o*	+	+	-	-	-	-	-	-	-	-	-	-	o*	-	o*	o*	o	o	o	o	-	-	-	-	-	-	o*	o
10. Surface coatings		+	-	o*	-	-	-	o*	-	+	+	-	-	-	-	-	-	-	-	-	-	o*	-	o*	o*	+	+	+	+	o“	-	-	-	-	-	o	-
11. Tobacco, food		+	-	o*	-	-	-	o*	o*	+	+	-	-	-	-	-	-	-	-	-	-	o*	-	o*	o*	o	o	o	o	-	-	-	-	-	-	o	o
12. Adhesive tape		+	-	o*	-	-	-	o*	o*	+	+	-	-	-	-	-	-	-	-	-	-	o*	-	o*	o*	o	o	o	o	-	-	-	-	-	-	o	o
13. Jewlery, watches		+	-	o*	-	-	-	-	-	+	+	-	-	o	-	o	o	+	+	+	+	o*	-	+	+	+	+	+	+	o“	o“	+“	+“	-	-	+	+
14. Product-inherent contamin.		+	-	o*	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	o*	-	o*	o*	-	-	-	-	o“	o“	+“	+“	-	-	o	o

- not suitable o limited suitable + suitable *depending on grain/particle size “good results only in combination with other methods

6. Exemption from Liability

No liability can be accepted for the preciseness and completeness of this recommendation.
Liability possibly arising from applying this recommendation is excluded for all circumstances, in particular any damages, no matter on what legal consideration the claim might be based.

7. Regulations, Standards, Guidelines

(please note that some of these documents might no be available in English language):

EN 1672-2	Food processing machinery. Basic concepts - Part 2: Hygiene requirements
EN ISO 9001	Quality Assurance System (from interface to HACCP system: corrective and preventive actions)
ISO/DIS 14159 Draft	Machine safety - hygiene requirements for machine design
93 / 43 / EEC	Food - hygiene guidelines (equipment specification for cleanability)
75 / 319 / EEC	GMP directive (equipment specification for cleanability)
8 / 37 EEC	Directive on machinery (regulation of design of plants, equipment and components for better cleanabilty)
DIN 10 502-1, 3. standard draft 4.99	Transport containers for liquid, granulated and powdered foods, part 1: materials and constructive features
VDI 2660	Hygiene features for food processing plants and equipment
HACCP	Hygiene requirements for manufacturers and traders

Working Group for Machinery and Equipment in the Confectionery Industry: Hygiene Requirements for Machinery and Equipment in the Confectionery Industry

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