



Nordic Sugar
Member of Nordzucker Group

HACCP plan

on Fibrex® production



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1. Objectives

The objectives with this booklet are to

1. Explain and introduce Nordic Sugar's HACCP work to customers and authorities
2. Exchange general experiences with HACCP plans throughout the organisation
3. Create a common understanding of the HACCP method (calibration between factories)

The current HACCP plan addresses product safety associated with production of Fibrex®

3. By using the decision tree (2.3.) we have identified where the hazards should be controlled along the production chain. Based on the risk classes the decision tree is used to determine whether a given process step is a critical control point (CCP), a point of attention (POA/GMP) or just a periodic measure (PM).

4. Apart from product specifications, process diagrams, risk analysis tables and summary tables, also activities towards verification of the HACCP system are documented. These activities are e.g. audits, sampling and analysis of products, analysis of deviations and customer complaints.

2. The method

The HACCP plans at Nordic Sugar are based on the GMP+ method (International Feed Ingredients Standard - IFIS) and the international food safety standard ISO 22000. We have taken every identified hazard in the whole process chain and evaluated them with regard to three basic steps in this method (the fourth step below is the verification of the system). This procedure has clarified where the hazard should be controlled, how the hazard should be controlled and what verification procedures are necessary.

1. Identification of chemical, physical, biological and allergenic hazards in each step of the process chain.
2. In a risk assessment (2.2.) the severity and probability of each identified hazard are combined to determine the risk class and the type of control method necessary.

2.1. Severity and probability

The severity of every possible hazard in the production chain has been estimated by the Nordic Sugar HACCP Reference Group independent of the current production process. The probability of each hazard is very closely associated with the processes and the current process equipment. The probability has therefore been determined by the local HACCP group at the factory.

2.2. Risk assessment matrix

Probability*	Severity		
	Small	Medium	Great
Great	3 POA Specific measures	4 CCP Critical measures	4 CCP Critical measures
Medium	2 PM General measures	3 POA Specific measures	4 CCP Critical measures
Small	1 No measures	2 PM General measures	3 POA Specific measures

* Refers to the probability of the hazard being present in the end product e.g. at the moment of consumption.

2.3. Decision tree

Where will the hazard be controlled?

- Q1: Are there identified hazards present which have a harmful effect on the safety of the product and/or can the hazard exist or increase to unacceptable levels?
Yes → Q2, No → stop!
- Q2: Which type of control measures are necessary according to the risk assessment?
Critical measures (class 4) → Q3, Specific measures (class 3) → include measures as POA and in verification procedures,
General measures (class 2) → include measures as PM and in verification procedures or no measures (class 1) → stop!
- Q3: Are the critical control measures referred to present?
Yes → Q4, No → Modify the process or product and start again at Q1.
- Q4: Has this process step been specifically developed to eliminate the risk or reduce it to an acceptable level? No → Q5, Yes → CCP!
- Q5: Will the risk be eliminated in a subsequent process step or will it be reduced to an acceptable level? Yes → Stop, No → CCP!

3. Identification of CCPs and POAs

The way Nordic Sugar differs between a CCP and a POA

CCP

- A high risk step, which is likely to get out of control
- Critical (and possible/applicable) control measures are needed in order to prevent, eliminate or reduce food & feed safety hazards to an acceptable level
- If measures are out of control the corrective actions must include isolation of product batch, retesting, decontamination or destruction
- The hazard is not eliminated or reduced to an acceptable level at a later stage in the process
- If not in control the end product constitutes a serious health risk

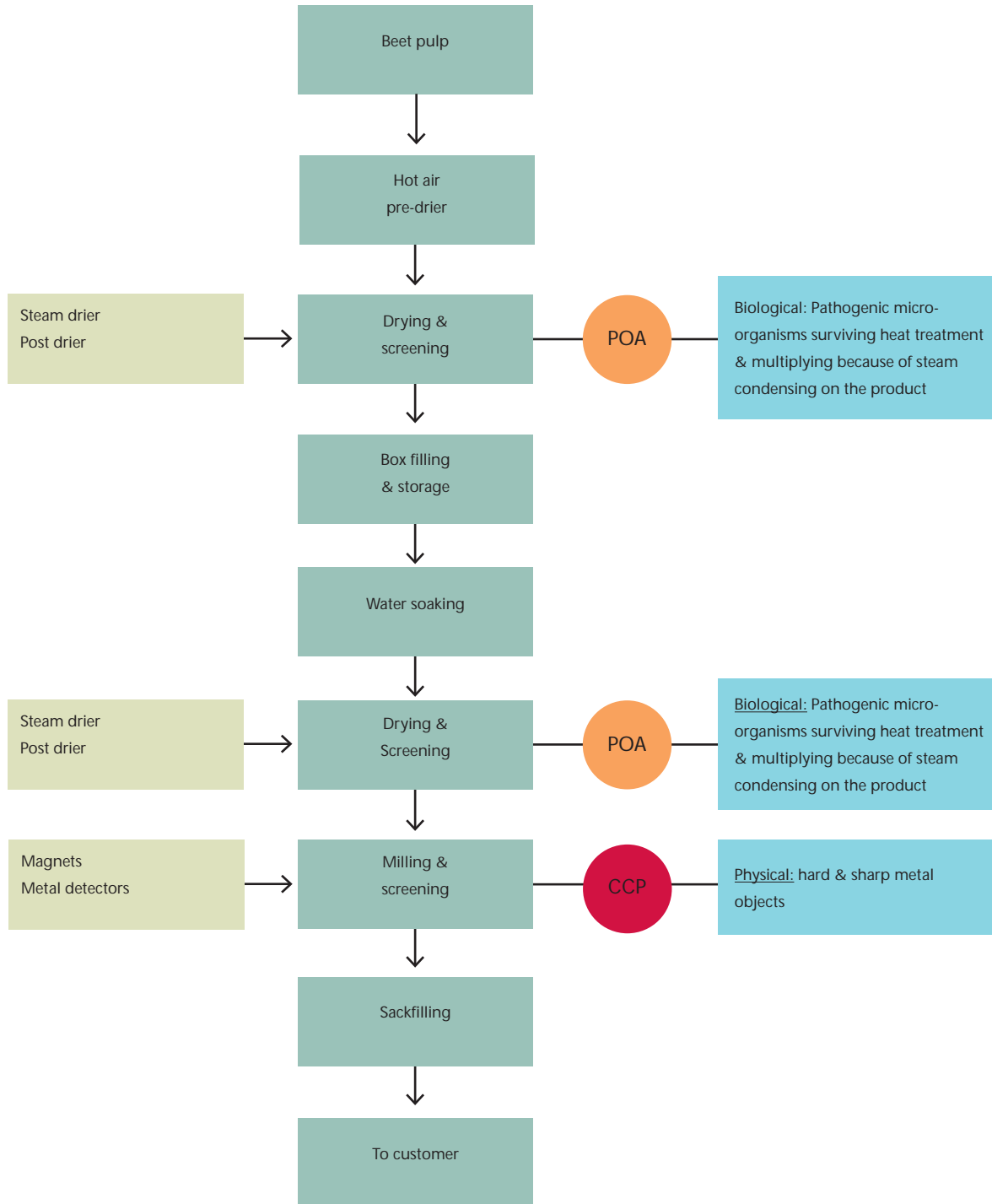
POA

- A moderate risk step
- Specific control measures essential to control the likelihood of introduction, contamination and/or proliferation of food & feed safety hazards
- The hazard may be reduced at a later stage in the process
- If measures are out of control the corrective actions include reevaluating procedure and/or checking equipment

*In total two POAs and one CCP have been identified for the production of Fibrex.
(see 3.1. Fibrex production process).*

3.1. Fibrex production process

General process steps and description of CCPs and POAs



See description of hazards, control measures, action limits and corrective actions for these process steps in table 3.2. and 3.3.

3.2. Hazard analysis table (risk evaluation)

Processing step		Potential Hazards	Control measures
		introduced, controlled or enhanced at this step	applied at this step to prevent/reduce/eliminate the hazard.
1	Drying & screening	(B) Mycotoxin producing fungi or pathogenic bacteria surviving heat treatment. Multiplication of these microorganisms later in the process if steam condensing on the product	Processing control Right temperature & pressure
2	Drying & screening	(B) Mycotoxin producing fungi or pathogenic bacteria surviving heat treatment. Multiplication of these microorganisms later in the process if steam condensing on the product	Processing control Right temperature & pressure
3	Screening	(P) Presence of hard & sharp metal objects 3 - 25 mm.	Continuous screening with magnets & metal detectors

* Refers to the questions in the Decision tree (see 2.3. Decision tree).

B=Biological

C=Chemical

P=Physical

SM=Specific measures

CM=Critical measures

Is this step a critical control point?

Evaluation of hazard

Severity and probability in the risk assessment matrix gives the risk class

Decision tree questions
1 / 2 / 3 / 4 / 5*

CCP/POA/PM Comm. / Ref.

Great x small = 3

Yes / SM → POA

Drying (steam & post drier) is a POA for microbiological hazards

Great x small = 3

Yes / SM → POA

Drying (steam & post drier) is a POA for microbiological hazards

Medium x great = 4

Yes / CM / Yes / Yes → CCP

Screening with magnets & metal-detectors is a CCP for metal hazards

3.3 HACCP Summary table

CCP or POA	Process step	Hazard to control	Control Method	Frequency
1 POA	Drying & screening	I. Survival of pathogenic microorganisms II. Mycotoxin production	I. Temperature & pressure control II. Dry matter (DM) content	I. Every 2 hour II. Every 2 hour
2 POA	Drying & screening	I. Survival of pathogenic microorganisms II. Mycotoxin production	I. Temperature & pressure control II. Dry matter (DM) content	I. Every 2 hour II. Every 2 hour
3 CCP	Screening	Presence of hard & sharp metal objects	Specific method to check the magnet or metal detector efficiency (test objects identified or caught)	Every shift

Action limit

Corrective action

- when action limit is exceeded

Responsible

Reference

I. According to norm.

II. DM < 87%

I. Rework

II. Rework

Drier
operator

Local instruction for activities
covering this area

I. According to norm.

II. DM < 87%

I. Rework

II. Rework

Drier
operator

Local instruction for activities
covering this area

Target limit: The test objects are being identified
in product flow

Action limit: Test objects not identified by
metal detector in the product stream

Rework

Drier
operator

Local instruction for activities
covering this area

4. Verification process

Sustaining a high quality and secure HACCP system requires continuous evaluation and review of the system.

A Nordic Sugar review of the risk analysis and verification of the HACCP plans consists of the following elements:

- Trend analyses of monitoring of POAs and or CCPs e.g. how often do we identify broken sieves

- Sampling and analysis of end products as a part of our quality program.
- Evaluation of complaints and/or emergencies reported to Nordic Sugar.
- Internal and external audits.

Audits -with focus on e.g. hygiene and HACCP are performed by internal and external parties.

These elements are used to verify the current HACCP plans at the different production sites. The verification is done whenever necessary and at least once a year.



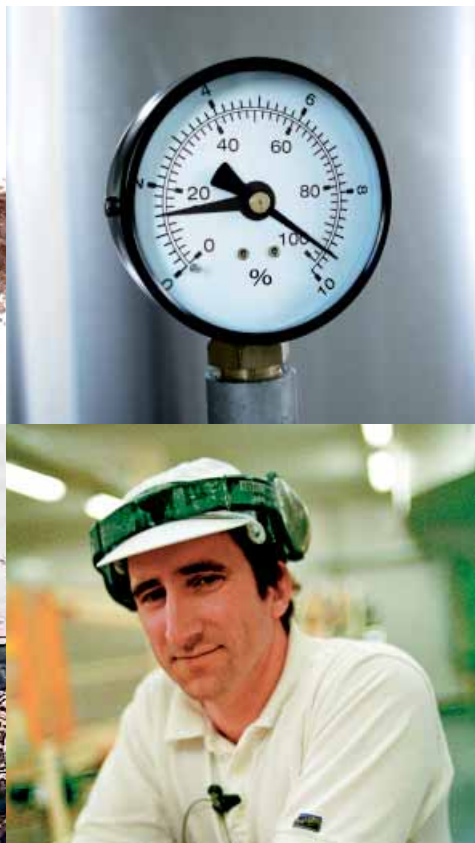
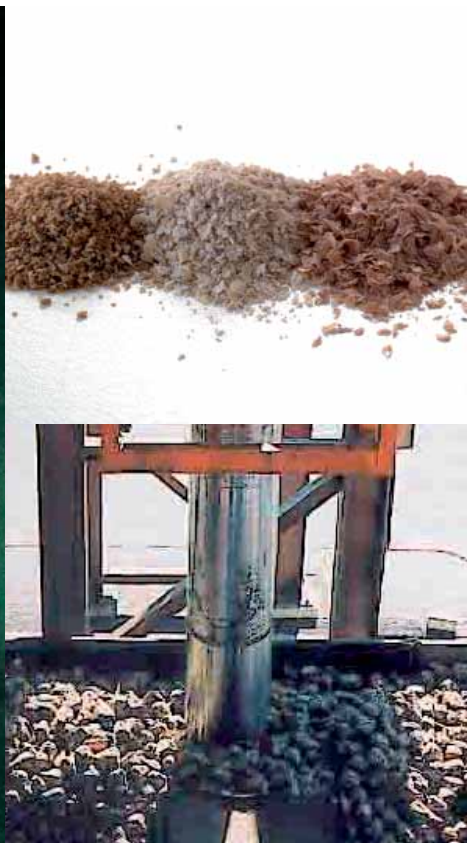
5. Documentation

In the description of our HACCP system the following documents are included:

- HACCP team documents (members and areas of expertise)
- Flowcharts i.e. process diagrams
- Hazard analysis tables
- HACCP summary tables (comprising exclusively POAs and CCPs)

These documents are handled in the document management system (DMS) for each factory. The product safety manager located at the production site supports the management and updates the documentation. Deviations from criteria set for CCPs/ POAs are reported and registered in a Deviation Database and/or the Laboratory Information Management

System (LIMS) or Production Information Management System (PIMS). Deviations identified at the factories (at e.g. audits) are reported and communicated in a Deviation Database. Customer complaints are registered in a similar database, "Sugar Complaints for sugar, Fibrex and animal feed products".





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