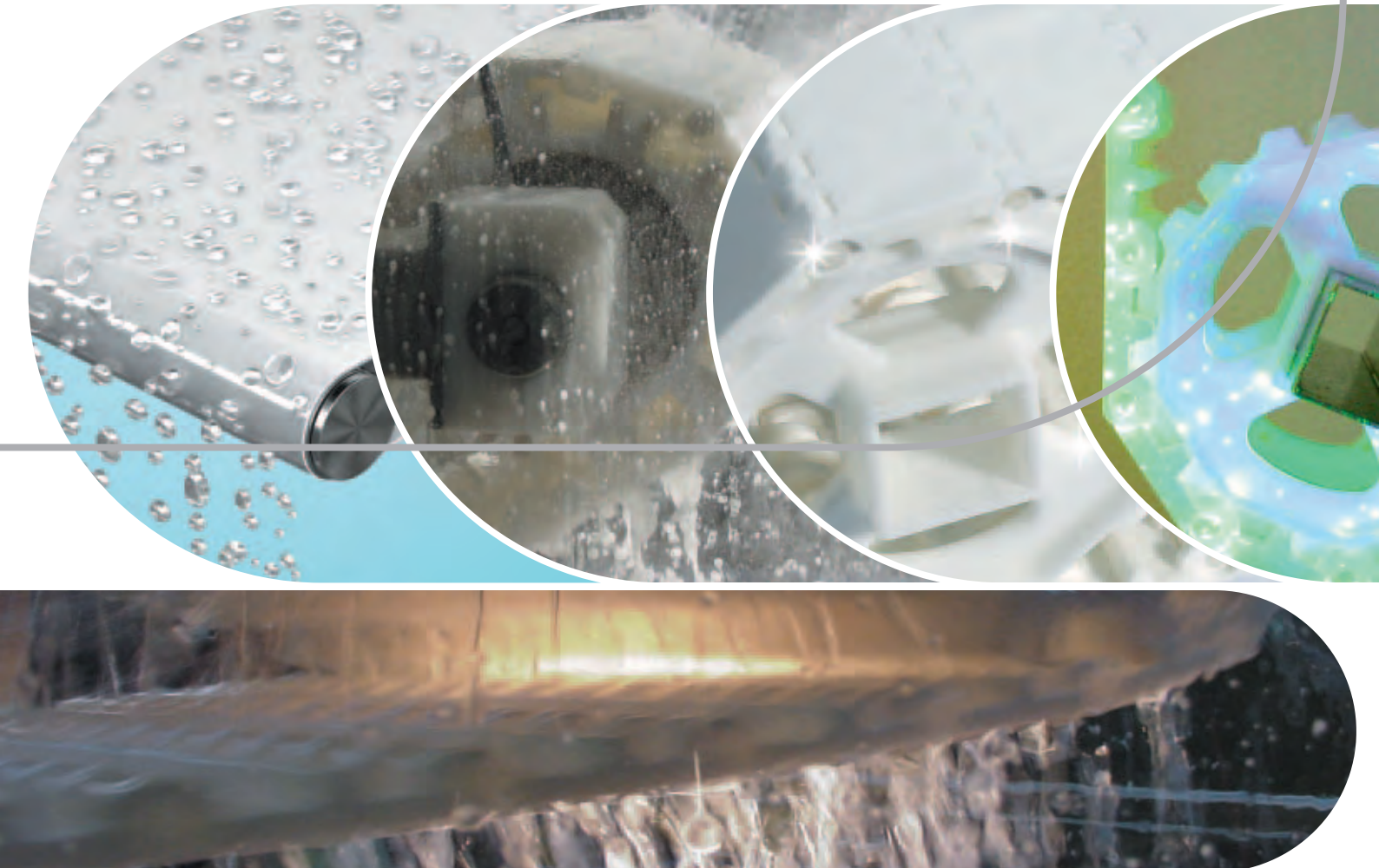


Hygiene Guidelines Of Habasit Conveyor Belts

Habasit – Solutions in motion



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This Conveyor Belt Hygiene manual is intended to provide a comprehensive and easily understandable guide to the cleaning and hygiene standards for lightweight plastic conveyor belts.

The statutory provisions and guidelines for food production and recommendations for cleaning that are described apply both to fabric-supported, coated conveyor belts and modular belts. The information available on individual topics does not claim to be exhaustive. Instead, our aim is to point out the main concerns and provide general recommendations and suggestions. We are well aware that the contents of this manual will need to be continuously updated in line with new legislation, new discoveries and product changes and it is our intention to do this.

One of the most important tasks in modern food production is to guarantee 100% product safety. Compliance with strict hygiene regulations can provide the basis for this.

Due to the steady increase in automated production, workers now often have no direct contact with the product from the time the raw material is supplied until the end product is packaged. However, this also means that it is all the more important that the product is inspected closely and defects promptly identified and also that raw materials/deliveries and products are traceable.

Changes in working and living habits in modern industrialized nations have also had a profound effect on people's eating habits. Today more and more ready meals or pre-baked and pre-cooked foods are produced. The proportion of non-preserved fresh (goods) products (sandwiches, salads, etc.) is also steadily increasing. Conversely, these have high levels of manual manipulation and hygienic manufacturing becomes critical.

In recent years, reports of food poisoning (in some cases, fatal), caused by contamination with bacteria or other micro-organisms, have escalated.

These incidents can be avoided with appropriate preventive measures on the part of food producers, backed up by machinery, plant and equipment design which conforms with hygiene requirements. Today in the food industry we speak of GMP (Current Good Manufacturing Practice), which essentially means taking all possible steps to avoid product

contamination in the preparation stage or during the production process. In Europe the EHEDG (European Hygienic Equipment Design Group) is specifically involved in the hygienic design of machinery and plant and is participating in drawing up EN industrial standards with CEN (European Committee for Standardisation).

Current good manufacturing practice (GMP)

In line with GMP guidelines, food-producing businesses must take account of the following criteria in particular:

- 1. Production site**
The site must comply with environmental protection guidelines with regard to smoke, odour, exhaust air, waste, noise emissions and other forms of pollution.
- 2. Architectural requirements**
All walls and floors within the production area must be readily accessible and easy to clean.
- 3. (Oxygen (atmospheric) conditions) Process air quality**
Only high-quality air filters and discharge devices should be fitted in food production units. Filters will depend on the sensitivity of the product to contamination.
- 4. Water supply**
Drinking water only should be used in food processing and for the final rinse after cleaning or disinfecting surfaces coming into contact with food.
- 5. Waste disposal**
Businesses should adhere to all provisions regarding waste water and refuse disposal.
- 6. Staff hygiene**
Businesses should comply with the food industry's special provisions relating to staff hygiene. These include personal hygiene, wearing correct protective clothing as well as regular documented health checks and training.
- 7. Checks on incoming raw materials**
- 8. Process monitoring**
Checking production processing time.
Not exceeding downtimes.
Checking individual critical production areas.
- 9. Correct cleaning and disinfecting**
a) Correct wet cleaning and disinfecting, if required.

- b) Correct dry cleaning, whenever possible, no disinfecting needed as this aggravates adding a water film e.g. to the conveyor surface which otherwise remains dry.

Food hygiene directive (FHD)

One of the strictest provisions currently governing the food industry is the Food Hygiene Directive – FHD. It gives general instructions on the principles of food hygiene and (on) risk and hazard analysis. The FHD recommends a HACCP – system (hazard control of critical control points) as a tool to achieve the required food quality. HACCP is described later (see "Food safety, HACCP and food conveyor belts", page 8).

Micro-organisms

In practice, a distinction is made between the following types of micro-organisms:

- pathogenic micro-organisms
- micro-organisms which are not harmful to health
- micro-organisms which cause food to spoil

The following table contains some examples of micro-organisms which are necessary for the manufacture of certain foods and are therefore deliberately added to the production process.

Micro-organism	Type	Product
Saccharomyces cerevisiae	yeast	baker's yeast, wine, beer
Penicillium camembertii	mould	Camembert, Brie cheeses
Streptococcus thermophilus	bacterium	Yogurt
Lactobacillus bulgaricus	bacterium	Yogurt
Gluconobacter suboxidans	bacterium	Vinegar
Acetobacter aceti	bacterium	Vinegar
Leuconostoc ssp	bacterium	Kefir

Deliberate use of micro-organisms

However, some micro-organisms may cause disease, poisoning or spoilage processes if they occur in the wrong concentration or at the wrong place.

Consequently, hygiene regulations for food production are concerned with all the necessary measures to prevent food from becoming contaminated with pathogenic micro-organisms.

Pathogenic micro-organisms in food

In the recent past, dangerous pathogenic micro-organisms have led to (frequent) well documented instances of food poisoning, particularly in highly

developed industrialized nations. These incidents (almost always) either affect quite large groups of people; the elderly, sick and children are the categories most at risk, or are particularly virulent to smaller groups.

This group of micro-organisms includes Salmonella, Escherichia coli, particularly 0157:H7 (-coli bacteria) and Listeria, for example.

The chief causes of food poisoning are:

- poor hygiene at the production stage (dirty plant or inadequate staff hygiene)
- food stored incorrectly (fluctuating temperature, food spoilt by being stored with other food)
- food prepared incorrectly (food cooked insufficiently)
- incorrect packing processes or contaminated packaging material
- condensed water in critical area
- bad air quality

Two typical types of food poisoning and their causes are described below:

- Salmonellosis

Salmonella are enteric bacteria which may be found in raw meat, poultry, eggs or milk products. They are destroyed by exposure to temperatures above (70 °C/158 °F for at least 2 hours) 110 °C/230 °F for 2 min or by heating food briefly to approx. 150 °C/302 °F.

Salmonella can be transmitted by man or by domestic or wild animals. Humans infected with Salmonella may transmit the disease for up to a year in their excrement without displaying any identifiable symptoms. Symptoms of salmonella poisoning are severe abdominal pain, headache, diarrhoea, vomiting, nausea, fever and loss of appetite. In severe cases the disease may prove fatal.

- Listeriosis

Listeria are common bacteria found on the ground, in soiled machinery, equipment or containers or in water. They are extremely difficult to eradicate and may grow and survive even in very humid or cold environments (e.g. in refrigerators). Listeria are destroyed when food is cooked. The symptoms of listeriosis range from nausea, vomiting, headaches to coma or organ damage. Listeria may cause stillbirth.

Food Hygiene

How can these and other forms of food poisoning be prevented?

- Education and training in the basics of food safety.
- Adhering to a high standard of staff hygiene (wearing protective clothing, washing hands regularly during the production process).
- Ensuring sufficiently high temperatures when food is cooked.
- Cleaning and disinfecting of food production machinery and areas appropriately and maintaining them in a clean state.
- Keeping production areas as dry as possible (listeria may grow in drains, pipes or in condense on factory ceilings).
- Avoiding cross-contamination via direct contact between raw and cooked food.
- Pest control
- Cleaning and disinfection separately
- Hygienic plant-design
- Prevention of condense water formation
- Control of the air quality
- Personal hygiene
- Good plant water quality
- Right storage and using of packaging material
- Consequent pest control
- Control of raw materials
- Immediate elimination of defect or corroded facilities
- Consequent separation of different hygiene areas

Food Safety, HACCP and Food Conveyor Belts

Alongside hazard analysis and determining critical control points, HACCP (Hazard Analysis and Critical Control Points) involves defining appropriate measurable target values monitoring and controlling these in practice, and determining the steps to be taken when limits within the production process have been exceeded. HACCP is to study and to decide how to have under control all significant hazards – related to conveyor belts these could be pathogenic micro-organisms as surface contaminants; toxic chemicals from conveyor belt materials (controlled by Habasit at design and manufacture); foreign materials when conveyor belts are badly installed or mishandled; chemicals from lubricants (if wrong type used) and from residues of cleaning chemicals if conveyor belts are not rinsed well.

The HACCP concept

The HACCP concept was developed back in the 60s as part of a joint project between the Pillsbury company and NASA. The aim was to provide the astronauts of the US space program with food of the highest safety standard.

Since the late 80's this safety concept has become a legal requirement for food manufacturers in most industrialized countries. In practice it means implementing the following seven HACCP principles:

- 1) Conducting a risk analysis
- 2) Determining critical control points (CCPs)
- 3) Defining thresholds
- 4) Introducing a process for monitoring CCPs
- 5) Determining corrective measures
- 6) Introducing monitoring processes
- 7) Verifying and providing proof of controls

Principles of HACCP concept

Conducting a hazard analysis is correct for hazardous micro-organisms, toxic chemicals and dangerous foreign materials or their sources. It needs to be determined which hazards are significant and need controlling. Those that cannot be controlled require modifications. For example conveyor belts that leached an unacceptable chemical into a product or have unacceptable surfaces need to be modified and re-designed.

Conformity with food safety standards

As manufacturers of conveyor belts for the food industry, we can support our clients in implementing the HACCP concept through hygienic product design. Habasit Food conveyor belts reduce risks and minimize critical control points. For example by supplying edge sealed or reverse side coated belts (see picture).

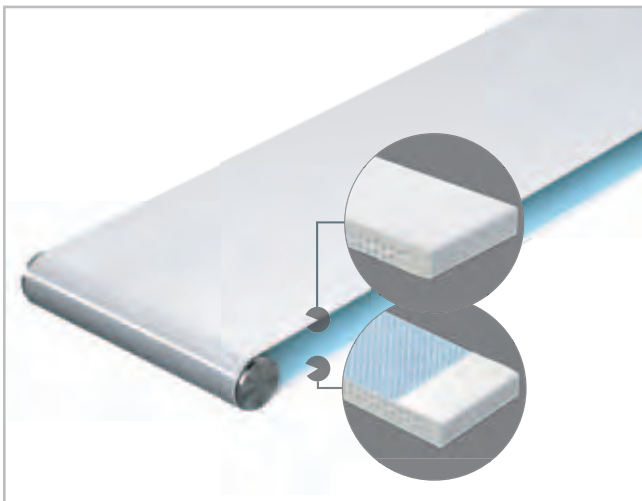
Machinery and equipment, accessories (conveyor belts, for example) and also cleaning equipment for the food industry may be described as parts of the system with low risk if they meet the following requirements:

- Adherence to food regulations (FDA, EU, USDA, etc.).
- Constructed and manufactured from materials which are not harmful to health.

- Design which conforms to hygiene requirements (smooth surfaces, (no blind spots) no dead areas in which product and micro-organisms can be harboured or corners, easy to clean).

Manufacturers of the products involved must be able to provide evidence, through certificates and safety data sheets, that they have met the legal requirements. In the conveyor belt industry, this relates to the manufacturers of the raw materials (such as cloth and plastic components) while the actual manufacturer of the conveyor belts must be able to confirm the relevant conformity in a self-declaration!

However, HACCP approval in the sense of FDA, USDA or EU conformity does not yet exist.



Edge sealed conveyor belt



M5010, Modular belt, reverse side

Conveyor belts and HACCP

Habasit Food conveyor belts support the HACCP concept and thus minimize the client's critical control points. The following measures guarantee hygiene, conformity with food safety standards and the correct use of our products:

- **Calender technology** ensures the surfaces of the conveyor belt are sealed and non-porous. These smooth surfaces make living conditions difficult for bacteria or micro-organisms (they have no opportunity to become established).
- **Reverse side coating, impregnation processes and HySEAL edge sealing** ensure a completely sealed, hygienic conveyor belt. In this way, no contamination (oils, fats, product particles) or moisture can penetrate the tensile carrier.
- **Anti-static finish** reduces the build-up of dust and dirt.
- Habasit food conveyor belts, produced from **chemically resistant plastics** (see chapter 5, page 21) are **moisture- and temperature-resistant** and therefore easy to clean. They comply with **EU, FDA and USDA regulations**.
- Conveyor belts with **blue coatings** and edge sealing improve product safety. The colour blue rarely occurs in food so **contamination** of goods caused by belt abrasion can be **easily identified**.
- Excellent **technical support** from our well trained **service and sales staff**.



4m Calender, Habasit AG, Reinach

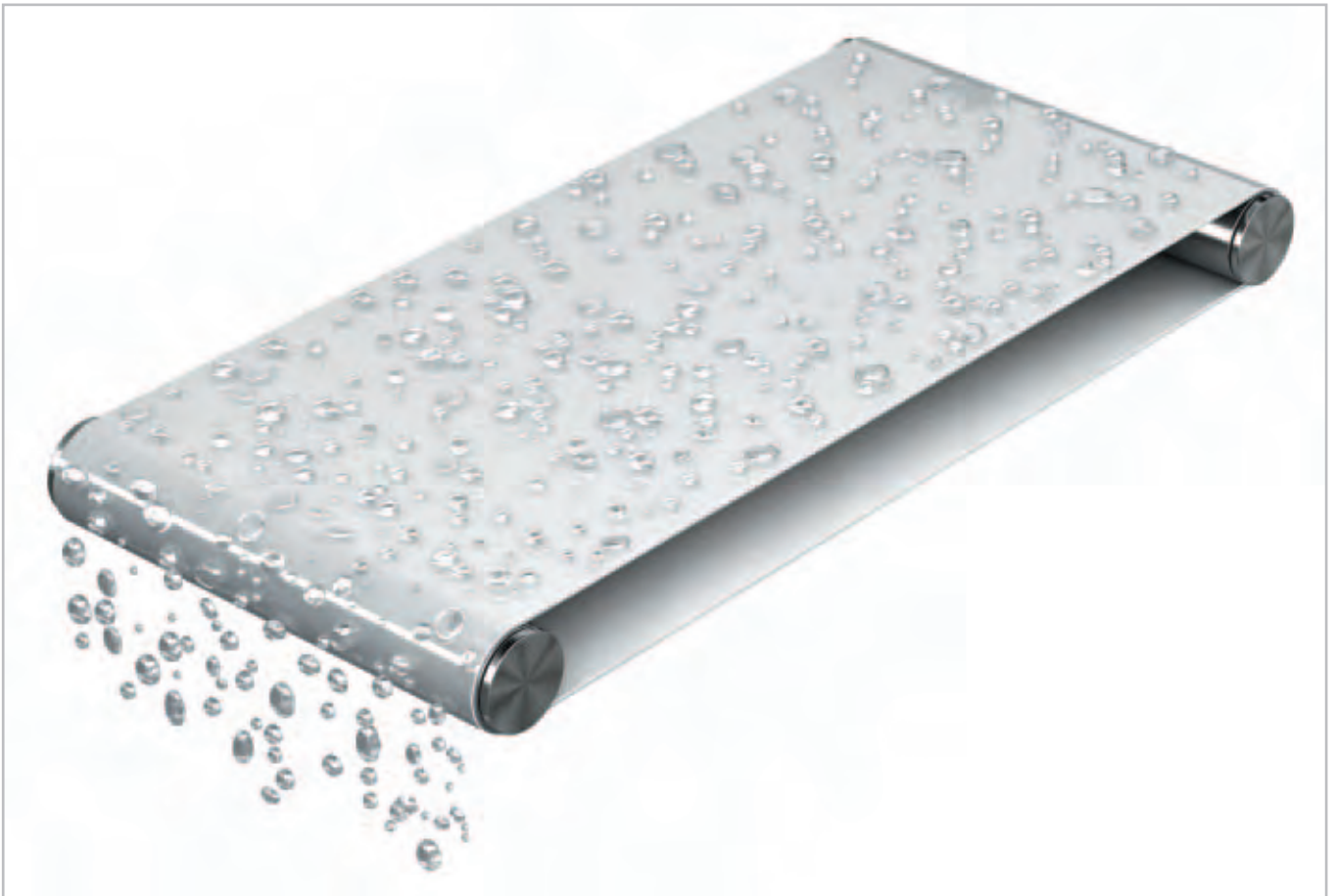
In the field of modular belts it is important to select the correct belt type. For a critical hygienic food application, it is important that belts are used with open hinges, so that the rods can be cleaned.

Another important thing is a smooth reverse of the belt (e.g. M5010, M2510, etc.), since often grid back structured types are used, which are very difficult to clean.

Conveyor belts as part of the process line

Conveyor belts are not an isolated item having supports, rollers, fixings etc. When clients do a HACCP study they look at the line as a whole because although the belt is well designed, it may be re-contaminated and be a source of hazards due to

faults in its installation. However, the reputation of the belt may depend on the hygienic quality of the total conveying system structure. Such points should be stressed when talking to clients and constructive advice should be given.



Ease of cleaning and good release – key elements to ensure hygiene

Hygienic design of machinery, equipment and conveyor belts is the basis for safe food production. However, in the food industry this is not sufficient by itself. Manufacturers can only ensure that their products are reliably protected against pollution and contamination by regular and proper cleaning.

Successful cleaning requires that the four main factors in the cleaning process are combined correctly:

- Mechanical/kinetic energy (cleaning method)
- Chemical energy (cleaning and disinfecting agent)
- Temperature
- Time

Cleaning methods in the food industry

A number of different cleaning methods are available in practice depending upon industrial sector, degree

of contamination and level of equipment. Table 2 shows a survey of frequently used methods and average cleaning temperatures:

Method	COP * cleaning/disinfecting		CIP * cleaning/disinfecting
	Manual	Semi-automatic	Fully automatic
	<ul style="list-style-type: none"> • sweeping • scraping • brushing • scrubbing • rinsing (hose) • wiping • vacuuming • dipping 	<ul style="list-style-type: none"> • vacuuming • spraying • brushing + spraying • dry vacuuming • rinsing, spraying • lathering, spraying 	<ul style="list-style-type: none"> • treatment in washing, rinsing and ultrasound machines • CIP (tanks, containers, pipes, etc.)
Temperature	up to 40 °C/104 °F	up to 60 °C/140 °F	up to 80 °C/176 °F

* CIP (Cleaning in Place), cleaning sealed systems

* COP (Cleaning on Place), surface cleaning (walls/ceilings/floors/conveyor belts/machinery, etc.)

When using the individual methods, please note the following points:

- The use of brushes and cloths involves considerable hygiene risk (cross-contamination). Subsequent spraying with or dipping in disinfectant is recommended.
- The success of manual cleaning largely depends upon the subjective capabilities and care of the staff.

- Unlike CIP cleaning, in COP cleaning, cleaning equipment should be made available and the solutions manually prepared.

One method frequently used in practice to clean conveyor belts, especially in meat and fish processing, is foam cleaning or TFC cleaning (TFC = optimised foam cleaning).

Cleaning and Disinfection

Cleaning agents

In the food industry, cleaning agents are selected on the basis of the type of soiling, corrosion resistance, parts or components being cleaned and the cleaning or disinfecting method. They may possess the following basic qualities:

- Completely and rapidly water soluble
- Wet all surfaces and materials to be cleaned well (not always necessary)
- Soak quickly and remove food residues (e.g. fats, proteins, carbohydrates, yeast, fruit pulp, etc.)

- Surface/material compatible
- Rinse off well

One single chemical does not usually possess all the qualities required. Consequently, in practice, combinations are used resulting in the following typical cleaning agents:

- Acid cleaners
- Neutral cleaners
- Alkaline cleaning agents
- Disinfectants

Examples of typical cleaning and disinfecting substances:

Acid cleaning agents	<ul style="list-style-type: none"> • Inorganic acids, e.g. phosphoric acid, nitric acid • Organic acids, e.g. acetic acid, citric acid • Solvents • Surfactants • Inhibitors
Neutral cleaning agents	<ul style="list-style-type: none"> • Phosphates • Surfactants • Peroxides • Complexing agents • Solvents
Alkaline cleaning agents	<ul style="list-style-type: none"> • Surfactants • Caustic soda solution/potash lye • Soda • Hypochlorites • Complexing agents
Disinfectants	<ul style="list-style-type: none"> • Peroxides • Peracetic acid • Quarternary ammonium compounds (QAV) • Hypochlorites • Aldehydes • Biguanides • Amphoterics • Alcohol • Chlorinedioxide ClO₂

Disinfectants reach a very wide range of micro-organisms, resistances of microbes do not occur. However, depending on the active matter some disinfectants do not kill specific germs (e. g. most of the surfactant based disinfectants avoid mould formation but are not suitable to kill high quantities of present mould). A change of the disinfectant makes sense if a micro species from an exterior source, which could not successfully be killed by the present disinfectant, enters the production plant.

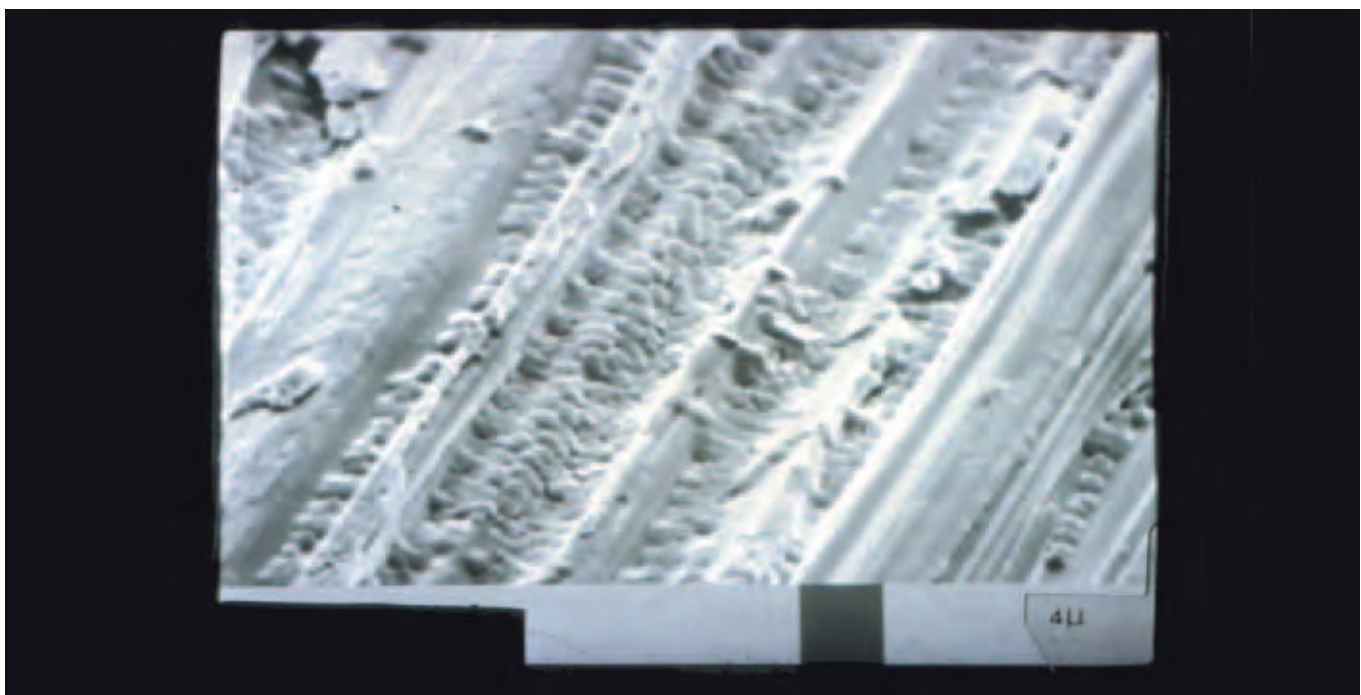
Frequently alkaline cleaning is used in the food processing environment because most of the present deposits are based on organic material. A sporadic acid cleaning is recommended to remove inorganic stains (e. g. water hardness deposits). However, areas being cleaned should always be rinsed thoroughly with water in between. (Example W-A-W-S-W-D-W). (W = rinsing with water; A = alkaline cleaning; S = acid cleaning; D = disinfecting)

Action of cleaning agents and disinfectants

Agent	Action
Alkalis	Remove organic substances such as carbohydrates, fat and protein deposits.
Acids	Remove inorganic constituents (salts, calcium, lime-scale, beer stone, tartar, milk stone deposits).
Surface-active substances (surfactants)	Relieve surface tension of water. Penetrate and emulsify contaminants (e.g. fats, proteins, etc.)
Neutral cleaners	All-purpose cleaners with good cleaning action can be used on virtually any material (good fat and protein solvency).
Per compounds peracetic acid)	Oxygen-releasing compounds (oxidants) which act quickly. (Hydrogen peroxide) Suitable for chlorine-free disinfecting.
Active chlorine preparations	Primary potent disinfectants as well as for bleaching
Chlorinated alkaline compounds	Used to remove tenacious organic deposits such as protein- or carbohydrate-layer as well as bleaching.
Alcohol preparations	Fast-acting spray and surface disinfectants (destroying bacteria and other microorganisms) are particularly suitable for surfaces susceptible to corrosion because they dry quickly.

The table below contains a summary of the efficiency of cleaning agent components with different types of soiling.

Contamination	Cleaning agent base		Other components	
	alkalis	acids	oxidants	surfactants
Protein and protein deposits	very good	good	in special cases	suitable
Oils and Fats	suitable	not suitable	in special cases	very good
Low-molecular carbohydrates	very good	very good	not necessary	not necessary
High-molecular carbohydrates	suitable	not necessary	good	in special cases
Salts and minerals	not suitable	very good	not necessary	not necessary



Stainless steel with bacteria attached (*pseudomonas aeruginosa* gram negative rods)

Cleaning conveyor belts – examples

The following two cleaning methods are used in most areas of the food industry to clean machinery and conveyor belts. Certain parameters may vary depending upon industrial sector, severity of contamination and the material of the surface being cleaned.

- Cleaning temperature
- Contact time
- Cleaning agent
- Mechanical forces
- Disinfecting

General recommendation for cleaning conveyor belts

Habasit recommends the following steps for cleaning conveyor belts:

1. **Preparation – switch off electric etc.**
2. **Gross solid removal**
3. **Pre-rinsing**

With pre-rinsing, coarse dirt is rinsed off or detached with warm water (up to 60°C) at low (max. 25 bar) pressure (high pressure causes increased aerosol formation → recontamination, moreover, material exposed to high pressure is subject to excessive stress).
4. **Cleaning**

At the actual main cleaning stage, stubborn dirt on the belt (e.g. oils and fats) is dissolved with the aid of chemical cleaning agents. Cleaning agents are generally applied as foam. In practice, however, under certain circumstances the belt is also scrubbed manually.
5. **Rinsing off**

In this stage, dirt previously detached or dissolved is rinsed off the belt with the aid of warm water (up to 60 °C/140 °F) and low pressure.
It is particularly important not to set the water pressure too high so that when rinsing off the conveyor belt neighbouring machinery, plant components, walls or floors are not contaminated again by splashes of material which has just been washed off (cross contamination).
6. **Check cleaning result**

Check all critical areas, e. g. visually or by ATP-measurement. Re-clean if necessary.
7. **Disinfecting**

Disinfection is recommended in all hygiene relevant areas of a food processing plant such as production equipment, conveyor belts, packaging machines, facilities, floors, walls and all areas identified within the existing HACCP-system. It should always be taken into consideration that also surfaces without direct food contact could cause hygiene risks in regard to cross-contamination.
Moreover, the conveyor belt must not be affected by cleaning agents and disinfectants. Therefore, note should be taken of the chemical resistance of the plastic, the directions for use and the dosage instructions of the chemicals used.
8. **Final rinsing off with POTABLE water**

After cleaning, and if required, the conveyor belt is rinsed off with potable water using low pressure. (All residues from cleaning agents or disinfectants should be removed from the belt before it is used again.)
9. **Check**

Disinfection result is checked using the appropriate method for the particular industrial sector (e. g. microbiological method: swab, contact plate).

Cleaning Conveyor Belts – Examples

Foam cleaning

Recommendations from Ecolab and JohnsonDiversey:
Cleaning with mobile or fixed foam devices

- 1) Preparation – Gross solid removal
- 2) Pre-rinse with water to remove coarse dirt (aid: rubber wiper); temperature up to 60 °C/140 °F.
- 3) Lathered surfaces to be cleaned (follow manufacturer's instructions for the amount of cleaning agent).
- 4) 10–30 minutes contact time (according to manufacturer's recommendation).
- 5) Rinse off with water; temperature up to 60 °C/140 °F.
- 6) Disinfecting (5–30 minutes contact time depending on disinfectant).
- 7) Rinse off with water; temperature: cold up to 60 °C/140 °F.

ECOLAB's cleaning routine



Low pressure cleaning of food conveyor belts

Cleaning Conveyor Belts – Examples

Gel cleaning

Recommendations from Kärcher and JohnsonDiversey for bakery, chocolate, meat and fish industry.

(Mobile cleaning device: e.g. Foam Star-FS2000, Kärcher)

Process	Cleaning stage	
	No.	action
Pre-cleaning	1	Remove coarse surface dirt mechanically or by rinsing with water
	2	Remove stubborn coarse dirt with plastic spatula or scraper
Cleaning	3	Apply gel cleaner thinly, (follow manufacturer's instructions for concentration)
	4	Allow gel cleaner to act for 10 –20 minutes
	5	Wash down conveyor belt evenly with spray device and a rotating washing brush, max. temp. 80 °C/176 °F (low or medium pressure up to a max. of 25 bar)
	6	Suck up dirt solution with wet-dry vacuum
	7	Allow conveyor belt to dry
Disinfecting	8	Apply disinfectant in appropriate concentration to the cleaned and dried belt
	9	Contact time according to dosage (see product information)
	10	Rinse off with potable water (max temp. 30 °C/86 °F).
	11	Suck up dirt solution with wet-dry vacuum (the appliance itself must be clean and disinfected!)






Cleaning Conveyor Belts – Examples

ECOLAB cleaning recommendation





Recommendations from Ecolab "Cleaning Recommendation for conveyor belts/HABASIT AG, COP-Cleaning & Disinfection, Food and Beverage Industries".



- Application:
COP (Cleaning-on-Place) / Foam application
- Specific application area:
Exterior cleaning (COP) of conveyor belts and other facilities in food and beverage industries.
- Typical residues:
Mixture of tallow, protein, fat, grease, microbes.
- Cleaning frequency:
daily
- General information:
To avoid microbiological growth and to ensure constant, reproducible cleaning results, we recommend regular daily cleaning. Drying up residues must be avoided. Dried residues make cleaning actions more difficult respectively prolong them.
We recommend using low pressure foaming systems.

Cleaning procedure & chemicals	%	° C/° F	min.	Notes
 Preparation for Cleaning				Remove food out of production areas. Remove food, trolleys and trays. Cover all sensitive parts. Gather large parts with a squeegee or broom and deposit the remains in a tray. Dismantle facilities if required according to the information given from the OEM.
 Pre-rinsing Water		up to 60 140		Rinse equipment, floor and walls with low pressure from top to bottom in the direction of the drain. Clean the drain.
 Collect residues				Collect residues with a wiper. Deposit them in a tray. Remove them to waste.
 Alkaline Cleaning (Tuesday to Friday) P3-topax 19 alternativ P3-topactive 200 P3-topactive LA Acidic Cleaning (Monday) P3-topax 56	2–5 2–4	up to 60 140	15–30	Foam from bottom to top. A contact time of 15 minutes is needed to soften and prepare the deposits. Use P3-topactive 200 to remove stubborn deposits. Use P3-topactive LA to remove organic soils from soft metal surfaces like aluminum. Use P3-topax 56 to remove mineral stains as well as greasy residues also from sensitive material. The daily change between alkaline and acidic cleaning is necessary to achieve best cleaning results!
 Intermittent rinse Water		up to 60 140		Remove deposits by rinsing with low pressure from top to bottom.

Cleaning Conveyor Belts – Examples

Cleaning procedure & chemicals	%	° C/° F	min.	Notes
 Cleanliness check				Check all critical areas, e. g. by CleanCheck (ATP-measurement). Re-clean if necessary.
 Acidic Disinfection P3-topactive DES alternative Neutral Disinfection P3-topax 99 or P3-topax 91	1–3	up to 60 140	15–30	Disinfect from top to bottom. Treat all surfaces completely with the disinfectant. Disinfect after each cleaning.
 Final rinse Water		up to 60 140		Remove disinfectant residues by rinsing with low pressure from top to bottom. Rinse with potable water.
 Store cleaning tools				To prevent cross-contamination, clean all cleaning tools and soak into a 1% P3-topax 99 solution. Refresh disinfectant solution every day.

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Important additional remarks!

Due to the diversity of materials and applications the information given above represents only a non binding guideline and is not intended to supersede the manufacturers specifications, limitations and recommendations. It is compulsory to follow the manufacturers limitations, especially concerning pH and temperature stability of the materials. The cleaning process should be individually optimized.

Practice

Chemical Resistance of Plastics

The following table shows the resistance of the plastics and coating materials used by Habasit to various cleaning agents. It is important to note however, that resistance may vary with different

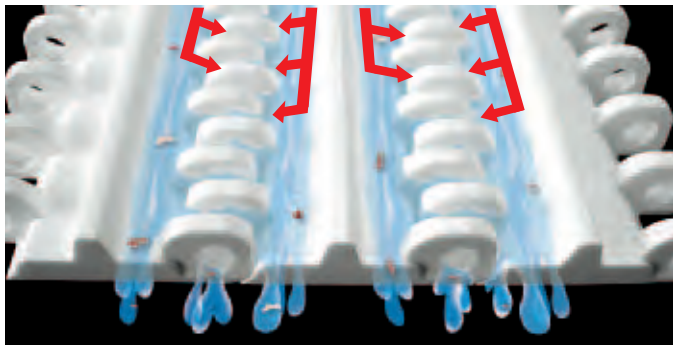
concentrations, temperatures, mechanisms and contact times. It is recommended that dosing information and instructions for use provided by the particular manufacturer are followed closely.

Cleaning agent base	Coating material/plastic						
	PVC (polyvinyl chloride)	TPU (polyurethane)	TPO (polyolefin)	Silicone	PP (polypropylene)	PE (polyethylene)	POM (polyactel)
Neutral	■	■	■	■	■	■	■
Alkaline	■	■	■	■	■	■	■
Acid	■	■	■	□	■	■	□
Chlorine	□	□	■	□	■	■	□

- resistant
- conditionally resistant

Plastic modular belting

HabasitLINK® contains several belt types with open hinge design which are specifically designed for the food industry. The solid flat top surface is ideal for processes involving cutting, trimming, impact, sorting, and inspection. The impact bar of M5010 on the underside of the module further reduces the possibility of damage resulting from impacts. The open hinge design allows easy access to connecting rods and areas between modules for sanitation and inspection. Habasit's oblong hole



M5010 reverse side cleaned by water stream

There are several key details that need to be addressed for effective sanitation of all plastic modular belting:

- The Conveyor Design
- Cleaning Methods
- Cleaning and Sanitation Chemicals

Conveyor design

(see also Engineering Manual)

Conveyor frames should be designed with sanitation in mind. Smooth rounded surfaces with no hidden pockets where debris can be trapped should be considered during the design phase. Guards and side panels are an effective way of minimizing the debris that finds its way to the interior of the belt.

Carryway

- Parallel Rail Support
This design is the most common construction. It provides easy access to the interior of the conveyor for sanitation.
- Full Bed Support
The full bed support is used for support in high impact applications. Sanitation is more difficult because there is no access to the interior of the conveyor.

ensures that debris that normally accumulates between the connecting rod and link in other designs on the market, is easily removed during the sanitation process (Fig. 1). Also for drainable applications the oblong hole is available in the M5033 FlushGrid. All of the injection-molded one piece sprockets incorporate an "open window" design that allows water and cleaning agents to reach the interior sprockets and shaft, reducing the chance that debris become trapped between sprockets.

Return way

- Roller Return
The roller return is the most economical design. It ensures areas for proper catenary sag and access for sanitation.
- Slider Bed or Rail Return
This design should be used when there are space restrictions. Increased wear on the surface of the belt and difficult sanitation are some of the drawbacks.
- Clean-In-Place Systems (CIP)
Although expensive to build, CIP systems can actually reduce labor costs and improve the effectiveness of the methods of sanitation.

Sanitation Guidelines

Cleaning methods

Manual cleaning

Habasit recommends a five-step sanitation process.

- **1st Rinse**

High temperature (+ 65 °C / + 150 °F) water under high pressure (25 bar) should be applied to loosen and remove any large debris from the belt, sprockets and conveyor frame. A CIP system or manual method is acceptable.

- **1st Chemical Application**

The chemical is applied to emulsify the remaining fats and oils. Generally the chemicals are applied foaming agents. Manual scrubbing is also acceptable.

- **2nd Rinse**

Moderate temperature water (+ 30 °C / + 90 °F) that low-pressure is used to wash away the emulsified fats and oils. Note: The key is to thoroughly flush the conveyor frame and belt.

- **Sanitation**

The sanitizing agent is applied to the belt in this phase. The compound should be specific to the microbes you wish to control.

- **Final Rinse**

Use low pressure to remove all remaining cleaning agents and thoroughly flush entire conveying system. High pressure should **NOT** be used. High pressure can cause particles from not cleaned applications to be spread to newly cleaned surfaces.

Clean-in-Place systems (CIP)

CIP systems can greatly reduce the amount of labor required to effectively clean Habasit modular belting. Even with a semi-automated sanitation system, manual cleaning and inspection is still critical.

- **ModulCLEAN inside out cleaning system**

Habasit offers the ModulCLEAN System, a specifically designed CIP to reduce cleaning time and costs. ModulCLEAN consists of a precision machined high density polyethylene multi-tooth sprocket with an engineered spray nozzle cleaning system. By combining the patented ModulCLEAN System with HabasitLINK® modular belts and HabaGUARD® antimicrobial technology, Habasit offers the most comprehensive package available to help you improve hygiene and sanitation standards in your plant.

ModulCLEAN improves cleaning due to:

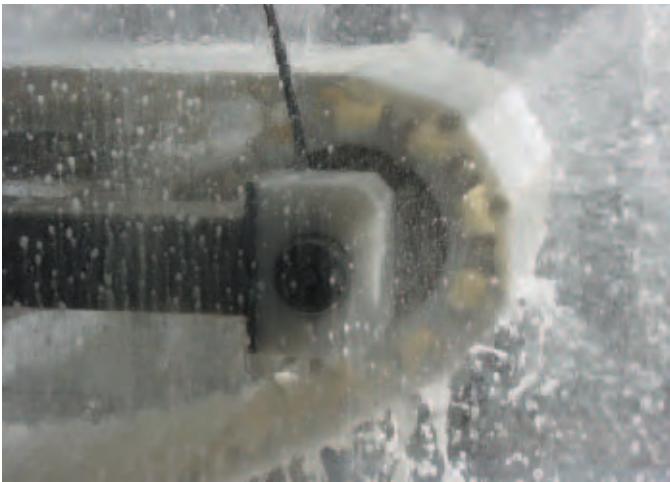
- Positive tooth engagement and precision nozzles aim cleaning water directly at the hinge area as it opens
- Combined with HabasitLINK's® open hinge design, cleaning from the inside out forces debris out of the belt
- Detergent and Sanitizers can be automatically applied



Sanitation Guidelines

ModulCLEAN saves money and increases productivity

- Since water and cleaning agents are directed only where needed, actual water usage and waste water processing can be reduced
- Improved cleaning in hinge areas and rod recesses can lead to longer belt life due to less abrasion / wear
- Automatic operation reduces labor costs and frees personnel for other activities
- Consistent cleaning increases on-time start-ups



The ModulCLEAN System is installed by replacing an idler roller with a ModulCLEAN unit, and connect the water supply. A detergent/sanitizer supply can also be connected, if desired.

• Other CIP-systems

Spray bars with nozzles aimed at key areas of the belt can be an effective method for dislodging debris and flushing the belt during the 1st rinse phase. Habasit recommends spray nozzles that have a "flat" spray area and be spaced to cover the entire width of the belt. If plumbed to do so, cleaning and sanitizing agents can be applied with CIP systems as well.



Typical flat spray nozzle

Habasit's M5010 is designed to expose the hinge and rod area when traveling around the sprockets. Spray nozzles located both inside and outside the belt at the drive or idle shafts will loosen debris that normally accumulates in the hinge area. The loosened debris can then be washed free of the belt with manually directed spray.



Ideal place for the spray bars is at the sprocket

Chemical Selection

Cleaning

Selection of cleaning chemicals is extremely important to maximize the benefits of plastic modular belting. The chemical agents emulsify the fats and oils allowing them to be washed away. Because soils can vary from plant to plant and even application to application, different chemicals may be required for each application. Water hardness may also affect a chemicals performance. Most chemical suppliers will perform water tests to determine the correct compounds required.

Habasit highly recommends that each plant contact their chemical supplier for help in choosing chemicals that are compatible with their water compounds and specific to the soils present and for general recommendations to optimize chemicals performance.

Sanitation

After the cleansing process removes the soils, the belt must then be sanitized. Proper sanitation eliminates any residual microbes that remain in and around the conveying surface. Sanitizing agents must also be tailored to the types of microbes each plant wishes to control. Habasit again recommends that each plant contact their chemical supplier for help in choosing the correct compounds.

Chlorine is widely used as a sanitizing agent. Habasit recommends that a chlorine solution not exceed 200ppm chlorine. Belts should NOT be left in chlorine based solution for extended periods. Exposure time and concentration can affect the molecular structure of all plastics causing brittleness and discoloration especially in Polyacetal (POM).

The Habasit Solution

**At Habasit, we listen. We innovate.
And we deliver integrated belting
solutions – right first time.**



Customer first

Habasit understands that our success depends on the success of our customers. That's why we offer solutions, not just products; partnership, not just sales. Our innovative belting solutions are tailored exactly to specific needs. We guarantee best value for money in every application. Since its foundation in 1946, Habasit has proven this understanding of customer needs for more than 50 years. That's why we are the no. 1 in belting. Worldwide.



Product range

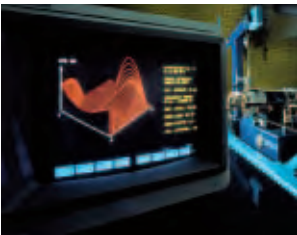
Habasit offers the largest selection of fabric and plastic modular belts in the industry. Our answer to any request is nothing less than a specific, tailor-made solution.

Fabric conveyor & processing belts
Plastic modular belts
Power transmission belts
Machine tapes
Seamless belts
Round belts
Timing belts
Auxiliaries (e.g. profiles, tools)



Innovation / R&D

Habasit is strongly committed to the continuous development of innovative, value-added solutions. More than 3% of our staff is dedicated exclusively to R&D; the annual investment in this area exceeds 8% of the turnover.



Global network Facts & figures

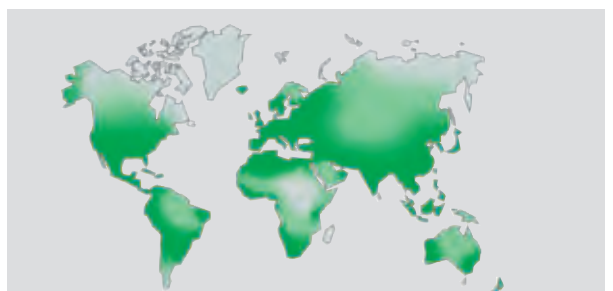
Founded	1946
Turnover 2003	CHF 418 million
Sales to market	4.2 million m ²
Employees	more than 2200
Production plants	12
Affiliated companies	26
Representatives	in over 50 countries
Service centers	over 250 globally

Services & guarantees

Our extensive organization is prepared to support you anywhere in the world. Engineering and emergency assistance, quotes and order status are just a phone call away. Wherever you are. Whenever you need us.

Quality

Highest quality standards are found not only in products, but also in our employees' daily work process. Based on a worldwide TQM approach, Habasit started very early to implement a quality system and was certified already in 1987 according to ISO 9001 / EN 29001. In 1996 Habasit was certified according to ISO 9001:1994. Since then we undergo periodically quality audits performed by an independent certification body. In the year 2002 we achieved certification according to the revised standard ISO 9001:2000.



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