

Hygiene Code for the private household

Based on the Dutch situation

Colophon

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Contents and development

This 'Hygiene Code for private households' has been brought about thanks to the input of experts in broadly composed steering and working groups (see appendix). This first version resulted from discussions held among these groups. The hygiene code must be seen as a dynamic document. The discussion about risks and measures, and with it the evolution of the code will continue. The development of the code has been made possible by a financial contribution from the Ministry of Agriculture, Nature Management and Fisheries, the Ministry of Housing, Spatial Planning and the Environment, the Ministry of Health, Welfare and Sports, the Dutch Soap Manufacturers Association and the Netherlands Nutrition Centre.

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Introduction

More and more data are available indicating that numerous (infectious) diseases are related to the home environment. Airborne micro-organisms (bacteria, fungi), mites (in sheets or carpets), and (parts of) insects and beetles may be the cause of respiratory diseases such as asthma (1).

In Europe and North America, more than half of the registered food infections appears to be contracted in the home (2, 3). For the Netherlands, this would amount to approximately one million infections per year.

Infections with rotavirus are often diagnosed in children attending day-care centres and primary schools. Contaminated children take the germs home, where further contamination (4) could take place.

At present, due to its changing composition a larger part of the population is exposed to infection. Estimates show that already some 20 % of the current population (the very young, the elderly, pregnant women, and the immune-compromised) belong to a group of people with an increased risk of infectious diseases and this group will continue to grow (5).

Then there is the development of new pathogens or the adaptation of micro-organisms to extreme conditions. An example of a new food pathogen is *Escherichia coli* O157, which can cause serious kidney damage (Hemolytic Uremic Syndrome, HUS), particularly in young children. As this bacterium is extremely acid-resistant, a few cells are enough to break (6) the (acid) stomach barrier. Adaptation to of acid conditions and resistance against antibiotics has also been demonstrated for *Salmonella* and *Staphylococcus aureus*. The latter pathogen in particular causes many problems in hospitals. Here, the pathogen is called MRSA: methicilline resistant *Staphylococcus aureus*. As many patients are being nursed at home, it is assumed that this problem will not remain limited to the hospital (7).

In many cases, the occurrence of adapted or resistant micro-organisms is a reaction to the changing environment. An example of this, is the development of cool chains for food products from production to consumer, which allows pathogens with a preference for cold conditions such as *Listeria monocytogenes* to grow. An another example is the *Legionella pneumophila*, a micro-organism which, under certain circumstances, may develop in systems containing stagnant water (pipes, showerheads). Inhalation of contaminated drops of water can cause pneumonia.

Domestic sources of infection

The main sources of infection in the domestic environment are people, pets, pests, and contaminated food and water. Germs are transmitted by direct contact with people or animals, by contaminated food, water, surfaces and air.

Under circumstances favourable to micro-organisms, the micro-organisms are able to survive or multiply into large numbers. Especially in places which stay moist for a long time considerable amounts of micro-organisms are found, among which pathogenic types.

When preparing contaminated food, the pathogens easily spread to cooking utensils (i.e. chopping board, knife, and herb jar) or through the cleaning of surfaces (dishcloth)(8). Some pathogens (*Salmonella* and *Campylobacter*) are only found during and right after the preparation of contaminated food, while large numbers of other types (*Listeria monocytogenes*) are also present at other points in time (9).

Home hygiene

The phrase 'home hygiene' does not merely refer to cleaning the house (daily). In practice, cleaning is not the only important issue; knowing how to prevent contamination is just as crucial.

In the above section it has already been mentioned that micro-organisms occur everywhere within the home, many types of which are useful, but many other types of which capable of causing disease. Domestic hygiene is the total sum of the measures used to prevent (insofar as is possible) contamination with pathogens, and thus decrease the number of infectious diseases.

The hygiene measures required can be divided into three groups:

- Hygiene during food preparation,
- Personal and sanitary hygiene, and
- Domestic environment.

Additional hygiene measures are required if patients are cared for in the home. For each situation it is necessary to know exactly how to act in terms of hygiene. National and international initiatives have been taken to provide the population with guidelines aimed at preventing domestic contamination as much as possible (10).

Purpose of the Hygiene Code for the private household

The home Hygiene Code has been drawn up on the initiative of the "Inspectie Gezondheidsbescherming, Waren and Veterinaire Zaken (Inspectie W&V)" [Inspectorate for commodities and veterinary affairs] of the Dutch Ministry of Health, Welfare and Sport and the "Voedingscentrum" [Netherlands Nutrition Centre]. The code uses the procedures used in the food industry: Hazard Analysis Critical Control Point (HACCP). Experts from various fields were clustered into four task groups and have identified and listed for the different domestic sub areas within Dutch households all potential health risks. In connection with the reduction of infectious diseases, a great deal of attention is paid to microbiological hazards, although chemical (toxins) or physical (presence of glass splinters) hazards are indicated as well. Following the inventory a risk analysis was carried out for each of the hazards mentioned, estimating the 'risk of' and 'seriousness of' certain hazards. For high-risk hazards, measures have been provided on how the risks can be reduced or eliminated.

The hazard inventory, the risk estimation, and the control measures are primarily aimed at the domestic situation in The Netherlands. In special circumstances, for instance in the case of an illness or allergy, one is advised to follow the instructions by the expert consulted (i.e. physician, obstetrician).

The total of control measures for high risk hazards in the three sub areas has resulted in the formulation of nine themes: seven main themes on the prevention of health threatening situations in domestic situations and two specific situations demanding further attention.

This Hygiene Code is an integral representation of domestic hazards and how they can be controlled. Some of these hazards are currently included in the programmes of organisations such as infant welfare centres, the "Astmafonds" [Asthma Fund], and the "SOA-stichting" [STD Foundation].

This document only contains a list of the hazards and the appropriate measures. In the case of an illness, allergy, or other specific circumstances, reference is made to specialised organisations.

There is a large difference between the hygiene codes drawn up for companies and this home hygiene code: all food processing and producing organisations are obliged to follow the Hygiene Code drawn up by and for its branch. Food production companies carry product liability, if their products appear to be carrying health risks. The consumer, on the other hand, is not obliged to adhere to the Hygiene Code and therefore has no liability.

This code is not directly meant for consumers, but serves as a resource for intermediaries (such as (professional) social workers, consultants, industry and trade) on which they can base their information and advice to consumers on and which they can propagate.

The main factor in correct hygienic behaviour is the consumer. Although the risk which one microbial hazard in itself poses is not that high, the hazard may be of overriding importance to i.e. a food infection: a combination of factors may cause great risk. The more factors exist, the more likely something will go wrong. In order to control the risks, hygienic behaviour should be the norm.

In addition to good information on the essence of hygienic behaviour, consumers should also be informed of alternative products and the proper use of food products, cosmetics, cleaning products, and domestic appliances. Manufacturers offering their products could play an important role in the information supply.

Reference

The Hygiene Code could be very useful as a reference for checking which domestic activity or group of activities poses the greatest risk and which control measure(s) would be appropriate.

The code starts with a chapter entitled Definitions, introducing the various terms used in the hygiene code. The following chapter is entitled Outlines and describes the nine themes, which are the result of the overall analysis. Next the risk analysis is represented. For the three different sub areas food preparation, personal and sanitary hygiene and domestic environment, pets and pests, actions and activities are described, hazards are determined and risks are estimated. The hazards are sorted by risk estimate: high, average and low risk hazards are given 1st, 2nd or 3rd priority respectively. The risks are provided with control measures. Where necessary, cleaning is discussed separately.

The text mainly deals with the highest priority risks and their control; further on, the potential risks and control measures of the priority 2 and 3 hazards are discussed. Similar to the chapter Outlines for total domestic cleaning, each paragraph starts with the results of the task field analysis concerned: a list of the control measures as action points.

The Dutch version also contains the risk analysis in tabular form on which the extensive text is based.

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1 Definitions

In this chapter various terms are introduced which appear in the hygiene code. Subjects relevant to only one sub area are treated in the introduction of the chapter on the sub area in question. Towards the end of the Hygiene Code a list of terms is included.

1.1 Hazards in the home

This document describes the hazards that exist in the home in the light of their risk and control. Hazards are defined as situations or events where there is a possibility of acute, short term or long term health problems. This may involve irritation, feeling ill, illness, injury, allergic reaction or death. The risk of certain hazards can be described as a combination of the possibility that the hazard takes place (chance) and the seriousness of its consequences to the health.

In order to prevent hazards or to minimise them, control measures are indicated. The control of certain hazards consists of one or more measures ensuring the reduction of the hazard to an acceptable (safe) level.

1.2 Micro-organisms

Micro-organisms are organisms, which experience at least one period during their life cycle when one single cell as individual multiplies¹. Micro-organisms can only be seen through a microscope. Micro-organisms are bacteria, fungi, yeast, viruses and protozoan. They exist everywhere: on the skin, on furniture, utensils, in the air, in water, on and in food. In many cases their presence is harmless and in some cases even wanted. Some micro-organisms, or pathogens, cause diseases.

If a human comes into direct contact with a pathogenic micro-organism, this may cause infection or intoxication: the micro-organism causes damage (illness) to humans. Not every contamination results however in an infection. The route in which the contact occurs is the first factor to influence the development of an infection. Human beings have natural barriers (skin and mucous) that are meant to keep micro-organisms at bay. If these natural barriers do not function properly, a micro-organism can enter the body.

Many micro-organisms in our bodies are harmless or even useful. A pathogenic micro-organism, however, may cause an infection. An essential precondition for an infection is that the infectious dose (ID) is exceeded. The ID is the number of micro-organisms needed to cause disease. The ID depends on the type of micro-organism, because micro-organisms may have different capacities for causing disease (virulence). Moreover, in the case of an infection, different micro-organisms can cause different disease symptoms; some infections have no symptoms. Whether contamination with a pathogenic micro-organism actually leads to infection depends on the type of micro-organism and the scope of the contamination, but also on the condition of its host (the person contaminated). Certain contamination may make one person ill, while another may simply feel slightly off colour, and a third person could feel perfectly well. The ID of a particular micro-organism is an average value whereby the fact that people with low resistance are more sensitive to infections than 'average' people needs to be taken into account. We are mainly referring to babies and young children, elderly people, pregnant women and immune-compromised (drug addicts, aids patients, people suffering from low resistance due to stress or medical treatment – for example with cytostatics); this group of people is also referred to with the English abbreviation YOPIs². Sometimes a non-pathogenic micro-organism is able to cause an infection within YOPIs.

Temperature is one of the main preconditions for the development of micro-organisms (see Appendix - Temperature and bacterial growth). Most micro-organisms thrive at temperatures between 10 and 50 °C and are destroyed by temperatures of higher than 70 °C. Heating is therefore an effective method for inactivating micro-organisms and eliminating the chance of contamination and infection by most pathogenic types. There are, however, micro-organisms that are able to survive heating by forming spores. Spores are minimal life forms of micro-organisms. Spores can grow into regular (vegetal) cells at the end of the heating process and the environment becomes favourable to growth. Besides spores, there are also various toxins that cannot be inactivated by heat. Heating at adequate temperatures does not always eliminate all risk of food infection or intoxication. In addition there are micro-organisms, such as *Listeria*, which are able to grow at temperatures as low as 0 to - 4 °C.

¹ Becht GPhM, Ridderbos GJA Levensmiddelenhygiëne, Utrecht 1996

² literally: young, old, pregnant, immune-compromised

The development of a (food) infection or intoxication is often caused by a concurrence of circumstances. We are talking about a combination of the following factors:

- Contamination (possibly more than one)
- Microbial growth
- A treatment whereby micro-organisms are not fully inactivated.

The multi-factor nature of the hazards calls for a wide range of hygiene measures and not just one.

1.3 Pests

Pests (also referred to as vermin) are animals which enter houses against our will to seek food, warmth, and shelter. Pests carries various pathogenic micro-organisms and is capable of spreading allergens. Therefore, pests are capable of causing health risks to the family.

1.4 Allergens

Allergens are foreign substances to which the immune system of some people reacts in an undesirable way. Depending on the allergen and the person in question this allergic reaction can cause various undesired physical reactions, such as vomiting, nausea, diarrhoea, skin reactions, runny nose, or asthma.

1.5 Cleaning and disinfecting

Cleaning is an activity where visible and invisible organic and inorganic material is removed. The combined effect of a detergent (in a solution), mechanical impact, and an increased temperature remove most micro-organisms together with the organic material. Most micro-organisms that survived cleaning still die when the wet objects are properly dried off. In domestic situations, proper and regular cleaning and drying is sufficient.

If necessary, disinfection can also be applied to reduce the number of micro-organisms to an acceptable level. There are two types of disinfection: thermal and chemical. Thermal disinfection is based on heating, for instance by steam. Chemical disinfection uses a chemical agent which kills micro-organisms. In The Netherlands, the permissibility and use of chemical disinfectants for the professional and domestic market is subject to the rules of the "Bestrijdingsmiddelenwet" [Pesticide act].

As a rule, chemical disinfection will only suffice if preceded by proper cleaning. The presence of certain forms of pollution may preclude the killing of bacteria as they "protect" the micro-organisms.

An exception are the so called combined preparations, where both actions - cleaning and disinfecting - are to take place simultaneously. Naturally, this approach is not recommended in the case of serious pollution.

The policy of the Dutch government aims at a limited use of chemical disinfectants in the domestic environment for the following reasons:

- In normal domestic situations, good and regular cleaning should suffice to prevent the risk of contamination.
- The lack of knowledge on the use of chemical disinfectants by non-trained individuals. The use of disinfecting agents requires knowledge with regard to their effect and application instructions must be followed. The correct order of actions, correct dosage, adequate exposure time, and (sometimes) proper rinsing determine the efficiency and safety of the disinfecting process.

Incorrect application of disinfectants could cause on the one hand infection or intoxication and on the other hand lead to the contamination of surfaces and foods with undesirable chemicals. A false sense of safety could also negatively effect unprofessional application of disinfectants.

- The use of substances that may have (needless) impact on the environment should be limited.
- Disinfecting agents can be corrosive, which may jeopardise the health when used in the domestic environment.
- Unnecessary use of disinfectants could lead to harmful micro-organisms adapting to these agents, which would then require the use of higher dosages of other agents.

In the domestic environment, there are occasionally forms of microbiological contamination whereby the removal of these micro-organisms by regular cleaning methods are inadequate to prevent the contamination from spreading and undesirable risks; in cases like these, there is question of medical grounds. Such cases require specialist help in the application of chemical or thermal disinfection (see further on in the paragraph).

As stated earlier, in domestic situations regular cleaning is usually adequate for the effective removal of dirt and risk-bearing micro-organisms. As we are dealing with a physical-chemical process, an adequate reduction of the number of micro-organisms can only be obtained if the detergent solution and residues of the contamination are effectively removed (by rinsing or wiping with a wet cloth).

In order to prevent the risk of cross-contamination, it is essential that firstly the micro-organisms are removed as much as possible, and secondly the conditions for survival and growth of the remaining micro-organisms are dealt with by removing organic material and moisture, in other words by cleaning and drying.

In situations that are likely to increase the risk of cross-contamination, or where there are organic substances which are difficult to remove, and standard cleaning methods are inadequate to remove micro-organisms or organic substances, special cleaning products can be used.

Such situations may occur in the following places:

- Kitchen: work top and cutting board
- Refrigerator
- Toilet
- Shower, and bath
- Air purification filters.

And the following situations carry extra risk:

- After changing a baby
- When someone in the home is ill (diarrhoea).

Special cleaning products are especially effective in specific situations or intended for special tasks. They should be safe to handle and their performance for the aimed application should be tested. Some special cleaning products do not just effectively remove dirt, but kill (part of the) micro-organisms as well. These products are not considered as disinfectants (they do not belong to the group of disinfectants for which permission by the Bestrijdingsmiddelenwet is required). The Appendix "(surface) cleaning products and their application" lists examples of the various types of special cleaning products and their areas of application.

For all cleaning and disinfection products, the concentration, application time and correct procedure affect the agent's efficiency. Following the instructions is of major importance. Correct dosage does not only affect product efficiency; too much of a product can cause needless damage to the cleaned area and the environment as well. Instructions on proper use and procedures of these products should be mentioned on the label.

The Hygiene Code recommends cleaning as control measure for various situations. The frequency of cleaning depends on the rate and degree of pollution of the area concerned. Therefore, frequency is often filled in as 'regular'. In some cases, an extra indication between brackets (weekly, daily, etc.) exists. In these cases it is left to the consumer to decide on degree of pollution and cleaning frequency.

If one family member or pet in the house is suffering from a contagious disease, there may be medical grounds to clean and disinfect. Whether medical grounds exist depends on the cause (agens) of the disease and the risk of cross-contaminating other members of the household. Clear medical grounds are, for instance, bad cases of diarrhoea and persistent athlete's foot.

The assessment of these symptoms and the application of proper measures are described as follows:

- A physician should determine medical grounds: there is a genuine case of an infection with an increased risk of cross-contamination within the household.
- If the consumer is unsure about the measures required to control the contamination or infection, professional help or advice is recommended. This should be obtained from a medical expert (like a general practitioner, the GGD physician for infectious diseases, or a vet) or a manufacturer of cleaning or disinfecting products.
- Disinfection should only be applied as a control measure when the use of (special) cleaning products and proper drying is likely to be inadequate.
- Disinfectants should only be applied to the area of application indicated on the product packaging, in compliance with the instructions and the correct application time. Prior to disinfecting, thorough cleaning should take place, as the presence of organic material may have a negative influence on the efficiency of the disinfectant. In the case of low pollution (which is often the case in private domestic situations after rough dirt particles have been removed mechanically), cleaning and disinfecting can be combined, in compliance with the instructions.
- If in specific situations, such as those described above, it has been decided to disinfect, extra measures recommended by a physician are often needed for effective treatment (see paragraph 4.9.2.1).

2 Outlines

In drawing up control measures for the high-risk hazards, nine themes become apparent: seven are on the prevention of health threatening situations in the home, and two specific situations, which are common to the home and need extra attention in this respect. These outlines not only illustrate cross-relations between various situations, but also indicate that different types of hazards (both microbiological and chemical or physical) can be controlled with corresponding measures. As these nine themes can be seen as a leitmotiv, they are introduced in this chapter. Cleaning the house in compliance with these outlines does not only eliminate high-risk hazards, but also simultaneously prevents low risk situations.

The nine themes are not listed in order of priority.

2.1 *Read the label warnings and the instructions for use*

The label and the instructions for use (on the product or on the packaging) offer a great deal of information on the application area (what) and method (how). They contain important information on:

- How long products (food stuff, cosmetics) can be kept
- How to store products (food stuffs, cleaning products, cosmetics)
- How to prepare food
- How to use cleaning products and what they are for
- How to operate domestic appliances (microwave, dishwasher) and how they work
- How to apply cosmetics.

In general, it is advisable to read the instructions of use and label warnings before buying a product in order to see whether it fits the requirements and the possibilities.

2.2 *Keep food hot or cold; heat thoroughly*

The temperature of food is of major importance to their shelf life and safety. There are three principles to be observed:

- Stopping microbial growth
Cold products must be kept cool (below 7 °C, preferably at 4 °C) until they are heated or used, in order to stop microbial growth. By doing so micro-organisms are not actually destroyed but their growth is prevented or restrained. To find out if a product should be stored at low temperatures, the instructions for use/label warnings must be consulted. Furthermore, if a product is stored at low temperatures in the shop, you should do the same at home (as quickly as possible).
- Destroying micro-organisms
Products are heated to destroy micro-organisms. The only effective method is to heat up thoroughly, which implies that the core of the product must have reached a temperature of at least 75 °C.
- Preventing microbial growth
Both heating up and cooling down of meals should take place quickly (within two hours). This prevents the growth of micro-organisms taking place during this stage (during which the product has an optimal growth temperature).

2.3 *Keep everything in the house dry*

Micro-organisms can grow anywhere in the house. An important precondition to microbial growth is moisture. Although most micro-organisms die in dry conditions, some of them survive by forming spores. In any event, micro-organisms will not multiply. Therefore, drying (removing moisture) can considerably reduce the risk of contamination.

Ensure that surfaces, utensils, and dry food stuffs remain or become dry. For example:

- Surfaces that have become wet by use, spillage, or cleaning activities such as work tops, floors, bath/shower
- Utensils: kitchen utensils, toothbrush, clean crockery, appliances
- Fabric: towels, facecloths, dirty and clean laundry
- Cleaning materials: tea towels, washing-up brush, dishcloth, floor cloth, cloths used for cleaning, etc.
- 'Dry' food stuffs: flour, herbs, bread, coffee.

2.4 *Air and heat the house*

Living and working creates a lot of moisture in the house. If the atmospheric humidity gets too high condensation occurs, allowing bacteria, fungi and mites to grow.

Depending on the construction of the house, the following measures should be taken to reduce the risk condensation:

- Heat the house in winter; keep the temperature in the house as stable as possible (rule of thumb: a difference of 5 °C between the minimum and maximum temperature).
- Air the house during all seasons; let fresh air in, moisture out and change the indoor air.

If outside temperatures are low (in winter), the relative humidity of the air outside is lower than that inside a heated house. This makes it possible for excess moisture inside the house to be extracted.

Adequate airing and heating also help to keep pests at bay. Furthermore, fresh air is needed to guarantee the oxygen supply for combustion appliances (such as hot water geysers, fireplaces) and the extraction of potentially hazardous gasses and substances.

2.5 *Keep 'dirty' and 'clean' items separated, prevent (cross-) contamination*

Some materials or food stuffs are hardly contaminated at all, while others are. It is crucial that contaminated products are kept separate from products that are not or no longer contaminated as contact may cause cross-contamination. Undesirable transmission of chemical substances may even occur for instance when cleaning products are spilled on food when they are put away.

Therefore, the following basic measures are required:

- Ensure proper closure or packaging of:
 - food (purchase, storage)
 - waste
 - cleaning products
- Ensure adequate separation of potentially polluting (contaminating) materials and materials which need to stay clean:
 - food: keep uncleaned or uncooked products separated from cleaned and cooked products
 - waste: place the rubbish bin outside
 - fabric: keep clean and dirty laundry separated
 - cleaning products: do not store cleaning products next to/under/over foods and close cleaning products properly.
- Use clean material and tools:
 - towels
 - face cloths
 - chopping board, knife and other kitchen utensils
 - cleaning material: dishcloth, cleaning cloth, tea towel, washing-up brush.
- Do not use a specific tool more than once without cleaning it in between jobs.
- Ensure direct cleaning and drying of materials, surfaces and hands after contamination or becoming dirty.

2.6 *Wash the hands often and properly*

If contaminated materials are touched or prior to preparing food the hands should be washed. This prevents potential contamination of the hands transmitting to other people, food or areas.

Hands are washed in the following manner:

- Use running water
- Pour a little soap onto the hands and add a little water
- Rub the hands, ensuring that the water and the soap are completely spread over the hands. Do not forget to wash between the fingers and under the nails, or the fingertips and palms. The hands are washed effectively if this step takes at least 15 seconds.
- Rinse the hands by rubbing them under running water
- Turn off the water. Try to avoid touching the tap with the clean hands, because this might cause recontamination (for absolute hygiene, turn off the tap using a piece of kitchen roll or a paper towel and throw this away).
- Dry the hands thoroughly using a dry, clean towel.

When do you need to wash your hands?

- Before activities, to prevent microbial contamination
 - Before preparing food
 - Before having a meal
 - Before applying or cleaning contact lenses
 - Before using sanitary towels or applying tampons.

- After an incidence of microbial contamination or activities where this is likely to occur
 - After performing highly contaminating activities during the preparation of food
 - After touching raw meat
 - After a visit to the toilet
 - After coughing or sneezing (in any case during the preparation of food)
 - After changing a baby
 - After touching a pet.

2.7 Clean and dry regularly

Surfaces, tools and equipment are polluted and contaminated through use. In order to prevent the contamination from transmitting to people, food or other materials when used again, cleaning is required. Cleaning is performed with water, a cleaning product (soap, dishwasher product, all-purpose cleaner or a specific cleaning product dedicated to special situations), and cleaning tools or materials (dishcloth, cleaning cloth, washing-up brush, sponge, floor cloth, mop, dishwasher, washing machine). The following domestic appliances should be cleaned regularly:

- kitchen:
 - work tops
 - refrigerator
 - cutting board, knife and other utensils
- toilet
- bathroom
- fabric: towels, face cloths, clothes
- frequently used rooms: living and bed rooms, including furniture;
- cleaning tools: tea towels, washing-up brush, dishcloth, floor cloth, cleaning cloths.

The following principles apply in domestic cleaning:

- If visible dirt (food rests, faeces, and soil) is observed, immediate cleaning is always required. To remove contaminated dirt (such as meat dripping, faeces) always use kitchen roll or disposable cloth first.
- As surfaces, tools and equipment also contain invisible dirt, regular cleaning is required. The frequency depends on how often the materials are used, the number of habitants or users concerned and the nature and scope of the contamination.
- Drying must follow cleaning.

2.8 Extra attention to hygiene with babies

Baby care requires extra attention to hygiene. Firstly because babies only have a low resistance. Secondly, because they increase the risk of contamination in the home themselves (nappies, bibs).

The basic principles are:

- Always use clean tools
- Ensure adequate separation of clean and dirty and contaminated materials
- Wash hands after changing the baby and before feeding
- Clean the tools used for changing the baby and dry them
- Clean the area where the baby was changed (commode) and dry it
- Always dry tools properly after use
- Daily disinfect bottles, teats and dummies by boiling, especially during the first six months.

2.9 Extra care for hygiene with pets

In general, pets are a source of pleasure for members of a family, but their presence carry certain risks.

Conscientious care and handling of pets lower the risks.

Pets are often carriers of zoonotic agents: micro-organisms, viruses and parasites that chiefly feed on animals.

Zoonotic agents may lead to contamination and infection (zoonosis) of humans. Therefore, the presence of pets in the house increases the risk of pathogenic (cross-) contamination. Contamination of food may cause food infection.

In order to prevent contamination with *Toxocara*, dogs and cats must be unwormed every six months, even if they stay inside. When emptying the cat box daily, use disposable gloves and properly wash the hands afterwards.

Touching pets contaminates the hands. While washing the hands after touching a pet is advisable, this is absolutely imperative before preparing food or having a meal. Pets should be kept out of the kitchen. If this is not possible (for instance with an open kitchen) clean the work surface in the kitchen before starting with the food preparation. Due to an increased risk of (cross-) contamination, the house should be cleaned more often.

The presence of pets also causes higher dust and allergen rates, which may induce allergic reactions in susceptible people (allergens are for instance flakes of skin, droppings, and respirable dust, feed). Extra airing reduces exposure to these allergens. If this is impossible, extra cleaning is required. Although not each susceptible individual may find these measures to be adequate.

3 Food care

3.1 Action Points

This chapter contains a list of the control measures or action points for all activities involving food care based on the hazard analysis and risk estimate. For high-risk hazards in particular action points have been defined.

Read the label warnings and instructions for use

- The 'best before' and 'use by' date on the label indicate the shelf life of products. Throw the product away when the 'use by' date has expired. Consumption of a product past the 'best before' date is possible, though not advisable.
- Labels contain storage instructions. If they are not complied with, the product will not keep until the 'best before' date.

Keep foods hot or cold

- Preferably buy refrigerated or frozen products at the latest instance; pack refrigerated and frozen products separate from non-refrigerated products, using a cool bag when possible.
- Take refrigerated and frozen products home as quickly as possible and immediately place them in the refrigerator or freezer.
- Ensure the refrigerator is used correctly
- Set the thermostat of the refrigerator to a maximum of 7 °C, but preferably to 4 °C (higher setting: lower temperature).
- Check the temperature in the refrigerator using a thermometer
- Store the most perishable goods in the coolest part
- In order for a refrigerator to cool, it needs space at the back to release heat. Ensure that this heat is discharged.
- Check the temperature of foods in the case of a power loss or defective refrigerator. Perishable products are to be thrown away when their temperature is between 10 – 15 °C throw away everything.
- Do not put too many products in the refrigerator
- Do not put warm products in the refrigerator
- Always close the refrigerator door as soon as possible
- Always place products (such as sliced meat and milk) back in the refrigerator immediately after use
- Throw away products of which the quality is doubtful
- Apply the FIFO system: place new (fresh) products behind old products
- Prevent cross-contamination: do not place raw meat over prepared products and seal products adequately.
- Clean the refrigerator regularly (once a month) and completely, and remove visible dirt and moisture immediately.
- Do not keep prepared meals and perishable products with open package, longer than 3 days in the refrigerator. Pickled products or products preserved with sugar can be kept longer, provided they are kept in the refrigerator. Check the label for the expiry date after opening.
- Let frozen products thaw inside the refrigerator. Take them out of the freezer the night before consumption or preparation.
- Ensure that heating up or cooling food is carried out quickly. Divide the product into smaller portions; in the case of large quantities, let cool in water with ice while stirring regularly. Keep hot meals that are not served immediately at temperatures above 70 °C. Keep cold meals below 12 °C.

Heat foods thoroughly

- Heat up food to a core temperature of 75 °C
- Use a meat thermometer to check the core temperature of for instance large joints of meat.

Prevent (cross-) contamination

- Check if the packaging is undamaged (vacuum) and clean upon purchase
- Ensure proper packaging of raw material and prepared meals and seal opened packaging properly
- Keep raw material separated from ready-for-use products and cooked food
- Keep pets away from food, dishes and food contact surfaces
- Clear away waste and spilled food directly
- Keep pests at bay.

Clean and dry regularly

- Clean knives, forks, cutting boards, etc. used for raw food (meat, vegetables). Do not use the same utensils for different products without cleaning them in between
- Clean dishes, work tops and cutting tools with hot water and soap and dry them afterwards
- Clean work surfaces regularly, in particular after preparing raw meat
- Change the dishcloth at least once a day.

Wash the hands often and properly

- Always wash the hands with water and soap before touching or preparing food and after visiting the toilet, after contact with raw material or the rubbish bin.
- After washing the hands, dry them with a clean dry towel
- Cover cuts and scrapes.

Other

- Check how the retailer treats and keeps perishable products. If in doubt, do not buy them.
- When storing products outside the refrigerator, check the following:
 - Can the products be kept outside the refrigerator?
 - What is the expiry date?
 - Do not store too hot or in the sun
 - Check the 'best-before' date
 - Ensure that products from open packages are properly sealed and kept cool if necessary
 - Comply with the expiry date on the label after opening the product
- Do not have nitrate-rich vegetables more than twice a week. Do not feed nitrate-rich vegetables to infants
- Do not keep nitrate-rich vegetables
- When deep-frying, mind the following
 - Renew the frying fat regularly
 - Do not overheat the fat (up to 180 °C)
 - Use an undamaged pan or appliance
 - Do not deep-fry too many products at once
- When using a microwave oven, mind the following:
 - Prevent cold spots (cold sections in the heated product) by dividing the product into smaller portions and stirring in between heating.
 - Do not use as primary heating source for meat products
- When eating raw or intentionally underheated products (such as filet américain, raw mince, soft unpasteurized milk cheese, bavaois, tiramisu, soft boiled egg), mind the following:
 - Be critical with quality: when in doubt, do not eat
 - Pregnant women, small children and people suffering from a reduced immunity should be extra careful with these products (they have a higher risk of infection).
 - Do not eat when suffering from a compromised immune system
- Cool down rapidly after necessary heating stage.

3.2 Introduction**3.2.1 Defining the scope**

Feeding family members starts with buying foods and taking them home. Then the food is stored and prepared as hot or cold meals. Serving, consuming, clearing away and washing-up are the subjects covered in this chapter. This Hygiene Code only deals with those activities and operations that can be influenced by the consumer himself and are directly related to the home. The prevention of quality defects and health risks of food as it is sold in the shop is beyond the scope of this code (the consumer cannot influence them). Their control belongs to the tasks and responsibilities of the manufacturer. The consumer can only be critical when doing 'the shopping'. However, some risks cannot be recognised in the store and consumers might discover the 'defect' after opening the packaging or even after consuming the product. By reporting this to the shop assistant and/or "Inspectie Gezondheidsbescherming, Waren and Veterinaire Zaken (I W&V)" the manufacturer can be held accountable. Health risks which are the manufacturer's responsibility are not treated in this Hygiene Code (examples are mad cow disease, dioxin).

Food allergy and intolerance

Food allergy and intolerance cause undesirable reactions after eating certain foods. Consumption of food to which one is allergic or intolerant, including products having the food in question as an ingredient will cause health problems. These problems may even be quite serious. A specific food allergy or intolerance characterises

an individual and not the food in question. Food that is considered healthy for one person may be hazardous to someone with a food allergy or intolerance.

In order to prevent people with a food allergy or intolerance from getting health problems, they should follow a diet. The food to which one is allergic is not to be taken. With a food intolerance of a certain nutrient, the threshold value is higher; an individually defined intake restriction of the nutrient will usually be sufficient. In order to be able to properly follow a diet, one should know the composition of foods. In accordance with the Labelling act, not all ingredients of a product have to be listed on the label. The information on the label does therefore not always give all the information people with food allergies or intolerances³ need.

People with a food allergy or food intolerance need more than the full composition list of products. They also need to know that small amounts of the food to which they are allergic or of which they are intolerant may cause health problems and that cross-contamination must be prevented. In practice, this means that the food products suitable for consumption have to be kept separate from those that cause health problems. Therefore, specific precautionary measures during food preparation are required, such as the use of separate cutlery, separate containers, etc. As the adjustments for food preparation are so typically related to the type of food allergy or food intolerance, this subject will not be treated in this code.

3.2.2 Definitions

Food infection

Food infection is caused by the living, pathogenic micro-organisms present in food. Contaminated food is health threatening. First of all, there is the possibility that the amount of pathogens present is higher than the infectious dose (ID). Consumption means a high risk of infection. Even a pathogen count lower than the ID may cause infection. Food contains sufficient moisture and nutrients for pathogens to multiply. Depending on the temperature and time, a minor contamination may develop into one exceeding the ID. When consuming food with a pathogenic contamination exceeding the ID, the pathogens will lodge in your digestive tract and cause damage: a food infection. The food serves as a means of transport for the pathogen. This usually ends in enteritis, which means an intestinal disorder: abdominal pain, diarrhoea sometimes in combination with fever. We are dealing with gastro-enteritis when the patient is vomiting as well. Food infection does not always lead to (gastro) enteritis. There are pathogens that, through a food infection, are capable of causing abortion, meningitis or tuberculosis.

Food intoxication

Poisonous substances (toxins) that are produced by micro-organisms in the food cause another type of disease. When this contaminated food is consumed, food intoxication occurs. A major cause of food intoxication is *Staphylococcus aureus*. This bacterium is found on the skin and in the mucous membranes of nose and throat of 30 to 40 % of the people. In certain conditions, this organism produces (heat resistant) toxins. In addition to food intoxication, this bacterium can also cause skin and eye infections, provided the conditions are favourable.

Food decay

Food decay is not necessarily health threatening. Food decay means a reduction of the quality of food of microbiological, chemical and/or physical nature, where the look, taste, smell and/or consistency of the food has changed. Therefore, food decay is easily spotted. Food decay which does not cause any health risks, such as biscuits turning rancid or emulsions breaking, are not considered hazardous and do not form part of this code.

Shelf life

In food care, the shelf life of food is important in many situations. For this purpose, two terms are used: "THT" date and "TGT" date.

"THT" date

Packed products with a shelf life shorter than 18 months and preserved foods in pots and tins have a "THT" indication. "THT" means 'possible to keep until the date indicated'. The manufacturer guarantees a good quality of the unopened product up to and including the indicated date. This does not mean that after this date the product is bad, but its quality does deteriorate.

³ The "Voedingscentrum" [Netherlands Nutrition Centre] provides lists of branded products

The "THT" date only applies when the product is kept in compliance with the instructions on the packaging. As soon as the packaging is opened, the "THT" date no longer applies. The shelf life of products once they are opened, strongly depends on the type of product.

"TGT" date

Products with a very short shelf life have a "TGT" indication. "TGT" means 'to be used before the date indicated'. The "TGT" date is the date on which the product is to be consumed at the latest. Similar products have a higher microbial risk than products with a "THT" indication. Products with a "TGT" date must be kept at indicated temperatures. Again, the shelf life indication only applies to unopened products, which are kept in compliance with the instructions.

Prepared meals

Prepared meals are home cooked meals which are ready for consumption. Prepared meals are discussed in different stages of food care if they are not consumed immediately. Usually they are to be cooled down first, and stored temporarily before they are heated up again for consumption. Leftovers are prepared meals that have been served before.

3.2.3 Hazards in food care

Hazards in food care can be microbiological, chemical, or physical. Microbial hazards are caused by pathogenic micro-organisms. Hazards due to pathogens are caused in various ways:

- By (cross-) contamination: if micro-organisms - possibly pathogenic - are transmitted to the food from the environment or through utensils or hands. If consumed, the contaminated food can (directly or in a later stage) cause an infection.
- By microbial growth, possibly combined with the forming of toxins. A microbial contamination can develop into quantities exceeding the infectious dose (ID). If consumed, the contaminated food is likely to cause an infection.
- By insufficient immobilisation of micro-organisms during the steps meant to destroy the micro-organisms or eliminate toxins (which have been produced by micro-organisms). This is particularly risky if it is assumed that the micro-organisms or toxins are all immobilised. Remaining micro-organisms and toxins are capable of causing food infection or intoxication when consumed immediately or after an incidence of microbial growth.

Apart from microbial hazards, there are chemical and physical hazards:

- Chemical contamination, where the food is contaminated with unwanted chemical compounds (i.e. cleaning products).
- Chemical conversion or reaction where unwanted chemical compounds occur in the food (i.e. the conversion from nitrate into nitrite or the occurrence of PAHs (Polycyclic Aromatic Hydrocarbons) due to food being burned).
- Physical contamination, where the food is contaminated with product foreign material (i.e. wood, glass, plastic).
- Physical reaction, which causes unwanted forces (i.e. exploding soft drink bottles).

Microbial high risk foods

Some products can cause microbial hazard in every situation. For these products, the occurrence, survival and growth are both likely (high chance) and high risk (serious health consequences). Similar products are indicated as having a high microbial risk. Examples are raw meat, chicken, shrimp, pate, moist cake (such as cream cake, etc.), soft raw milk cheese, and cut vegetables (refer to the Appendix on Perishable food products and their shelf life).

3.3 Shopping

Shopping includes the transactions in the store, the transportation of the products home, and the storage of the products sold. This section is about selecting products and transporting them home.

3.3.1 Selecting products

Shelf life, packaging and transportation are the factors to be considered.

3.3.1.1 Shelf life

Risks: 1st priority

Even before buying foods, the client should consider food safety and hygiene. An important aspect of foods is the limited shelf life, especially for products with a high microbial risk. The shelf life of foods is indicated on the packaging as "THT" or "TGT" date [Dutch abbreviations]. The package also indicates how the product should be kept to comply with the indicated dates. Some products do not have a 'THT' or 'TGT' date, such as non-prepacked products (i.e. meat from the butcher's). Other products merely indicate the date of packaging.

If the retailer does not store the products in compliance with the instructions on the package (especially with regard to temperature), the product will have a shorter shelf life than is indicated by the 'THT' or 'TGT' date on the packaging.

If a consumer is unaware that he buys a product of which the shelf life has almost ended, and stores it, the product is likely to exceed the 'THT' date unnoticeably. Consumption may lead to food infection.

Control

As foods have a limited shelf life, the consumer should take this factor into consideration. It is important when you buy, store, and consume the products. Before buying a product, read the 'THT' or 'TGT' date on the packaging. When buying non-prepacked foods, ask the shop assistant for the shelf life. A list of 'perishable foods' and their shelf life is included as an Appendix.

When buying a product, anticipate its usage. Do not buy large packaging if it is unlikely that the product will be used before the 'THT' date expires. For example: someone who lives alone should buy coffee creamer in cups, instead of a bottle: a bottle contains too much, the contents would perish before the 'THT' date expires.

The expiry dates on the packaging apply provided that the products are kept and stored in compliance with the instructions. This applies to storage by the consumer, but also by the retailer. Especially with perishable goods, it is vital that the consumer is critical of the retailer:

- Is the shop tidy and clean?
- Is the packaging undamaged and clean?
- Are perishable products kept in a chill cabinet?
- Does the retailer handle foods in a hygienic manner?

These considerations are all the more essential when the retail situations are improvised by non-professional, such as on fairs and events. In general, the appearance of a product (does the product look attractive) is a reasonable indication for quality. When in doubt, it is recommended not to buy the product but to look for an alternative.

3.3.1.2 Damaged packaging

Risks and control

2nd priority

If the packaging of a product is damaged, the product may be or become contaminated, which allows for microbial growth (depending on the product). The product may also contaminate other products (for example, vegetables may be contaminated by meat in damaged packaging). If vegetables or fruit (unpacked) are damaged, micro-organisms can multiply even quicker.

It is advisable to be critical of the products you buy. The packaging must be whole; unpacked products (i.e. fruit) must be sound.

3rd priority

Besides microbial contamination and growth, damaged packaging may also cause physical or chemical contamination. In this case, the product is exposed to foreign material, such as wood, glass, plastic, or oil. Parts of packaging material may even end up inside the product. Similar contamination may be health threatening, especially when it concerns glass. Therefore, it is recommended not to buy products in damaged packaging.

One should also be critical of tinned products. If a tin is dented, chances are that the inside coating of the tin is also damaged. This may cause a chemical reaction between the product (pickled products in particular) and the tin. The product may be contaminated by lead and tin, which are detrimental to health. One is advised not to buy dented tins. Bulged tins indicate that the contents are bad and should be thrown away.

3.3.2 Transport of refrigerated and frozen products

This paragraph deals with the transport of products from the shop to the house. As refrigerated and frozen products are the only ones that are open to specific risks, other products are not covered in this code.

3.3.2.1 Risks: 1st priority

When buying refrigerated and frozen products, the cool chain of the product is interrupted as soon as it is taken from the shelf and placed in the trolley, basket or shopping bag. The longer the product is kept outside the cooling facility, the higher the temperature will rise. The increase in temperature allows micro-organisms to grow. Depending on the nature of the product, the duration and the rise in temperature, the number of micro-organisms may rise infectious levels.

When refrigerated and frozen products are heated up, moisture is released (leakage). This liquid may contaminate other groceries with the micro-organisms it carries.

Control

Together with the retailer, the manufacturer of refrigerated products tries to maintain a continuous cool chain to prevent the product from spoiling. The consumer should be aware that this cool chain must be maintained until the product is (prepared and) consumed.

In order to minimise the growth of micro-organisms refrigerated and frozen products must be taken from the shelf right before paying the cashier. Contact with the unrefrigerated product heats up the refrigerated and frozen products quicker, the unrefrigerated products can be contaminated with leakage moist. A simple way to prevent the temperature rise, is the use of a cooling bag, preferably two: one for refrigerated products and one for frozen products.

Once bought, the refrigerated and frozen products are to be placed in a refrigerator or freezer as soon as possible. Especially when it is hot outside, these groceries should be left unrefrigerated for only a very short while and should not be left in a (hot) car, because you have to do other shopping.

3.3.2.2 Risks and control

2nd priority

Paragraph 3.3.2.1 explains that the trip home should be short to prevent the temperature of refrigerated and frozen products to rise.

This does also apply to other products, such as cheese and fish. In these products, the rise in temperature (hot car) not only leads to the growth of micro-organisms, but also to the formation of biogenetic amines. Some people are intolerant to biogenetic amines, large quantities of which are toxic to everyone. Ensure that the temperature of these products does not get too high (room temperature 20 °C).

Wrap the groceries in such a way as to prevent damage (and cross-contamination as a result) during transport.

3.4 Storing foods

Foods can be stored outside the refrigerator, refrigerated, or frozen.

3.4.1 General

3.4.1.1 Risks and control: 3rd priority

Keep storage areas tidy and clean. Ensure that all foods are hermetically sealed. These measures are required to prevent cross-contamination and to keep pests at bay. Clear away visible dirt immediately.

Packaging and storage facilities (such as fruit bowls, or containers) must be cleaned regularly. Empty and clean storage containers (for instance for muesli) before refilling them.

If fatty products are stored too long, there is a chance of (photo) oxidation of the fats. Although this does not jeopardise health it does, among other things, affect the flavour.

3.4.2 Storage outside the refrigerator

Outside the refrigerator foods can be stored in kitchen cupboards, storage cupboards or cellars.

3.4.2.1 Risks: 1st priority

The shelf life of foods depends on the storage temperature. Products that are to be stored refrigerated and are not perish very quickly. The increased temperature of the product may cause the pathogens present to multiply, after which consumption can lead to food infection.

Products which keep outside the refrigerator (for instance: vegetables, fruit, bread, and rye bread) are not always non-perishable. If the 'use by' date has expired, or if the products are stored outside the refrigerator at relatively high temperatures (higher than room temperature, such as in the sun or close to a CV boiler, or radiator) they turn bad quicker.

After opening the packaging, the 'use by' date on the packaging no longer applies. If the product is then stored incorrectly the product can turn bad. (See 3.9.1.3)

Control

The first question to be asked when storing foods is should the product be stored in a cool place? The answer to this question is found on the packaging. When it says 'store in a cool place', or 'keep refrigerated', or 'keep refrigerated after opening' the product is to be kept in the refrigerator. Non-pre-packed products often have no instructions for storage, check with the retailer where necessary. Raw meat, pate, moist cakes, soft cheese, and pre-cut vegetables should never be stored outside the refrigerator. A rule of thumb is that what is stored in a cool place by the retailer, must be stored in the refrigerator at home.

To store products correctly, follow the instructions on the packaging. They contain information on the storage temperature and shelf life ('THT' or 'TGT' date see 3.3.1.1). It is recommended that the expiry date is checked prior to consumption, although it would be safer (and more economical) to do this regularly, conducting some sort of 'storage management'. Fresh products are placed at the rear, so that the products stored first are consumed first (the 'first in first out' principle, or FIFO).

In specific humid conditions products containing peanuts, buckwheat, corn products, nuts, herbs, and grain may become mouldy fungi which can cause the forming of mycotoxins. This process is faster at higher temperatures. Therefore, these products are to be kept in a dry place at room temperature.

Ensure that when 'storing outside of the refrigerator' temperatures are kept below room temperature (approx. 20 °C). At higher temperatures, the shelf life of foods will decrease. Do not place foods in the sun, near a stove, or other heat source.

3.4.3 Storage in the refrigerator

3.4.3.1 Storage temperature and duration

Risks: 1st priority

The purpose of a refrigerator is to prevent the decay of foods and the proliferation of pathogens. At sufficiently low temperatures micro-organisms will hardly reproduce or reproduce very slowly, which prolongs product life compared to outside the refrigerator. There is, however, still a chance that refrigerated products grow microbes if the temperature setting is too high, the refrigerator has been loaded incorrectly, and the temperature in the products remains too high due to stagnated air circulation, or if the food products are kept too long. In these situations pathogens can thrive to infectious numbers.

Control

Correct setting

In order to use the refrigerator in the proper manner the temperature inside should be kept low enough, which is between 4 and 7 °C. Microbial growth is best prevented by keeping the temperature around 4 °C. The temperature is set using the temperature regulator inside the refrigerator. It is usually graduated from 1 to 3,

5, 7, or 10. The higher the value, the higher the setting, the lower the temperature. For most refrigerators a setting of around 60 % will suffice (which means 3 on a scale of 5, and 6 on a scale of 10, etc.).

Inside the refrigerator the temperature varies. There are two types of refrigerator: refrigerators with back wall cooling and top cooling. With back wall cooling the coldest places are at the back and below (over the salad compartment). With top cooling, the coldest place is at the top towards the rear of the refrigerator. Refrigerators with *** or **** freezer compartments are back wall type refrigerators, and * or ** refrigerators have a top freezer compartment and the cooling element for the refrigerator faces downwards. Refrigerators without freezing compartments can be either type. Therefore, the consumer should know which type of refrigerator he has. Read the user instructions and use a (minimum/maximum) refrigerator thermometer to measure the temperature inside the refrigerator in different places.

Use the differences in temperature inside the refrigerator as well. Store perishables in the coolest places and products such as soda and beer, which can be kept outside the refrigerator, in the least cool places.

The refrigerating output also depends on the environment of the refrigerator. Adequate heat release is a prerequisite for both built-in and separate refrigerators.

Use of refrigerators

A refrigerator cools by means of air circulation. The fuller the refrigerator, the longer it takes to bring everything down to the right temperature and to maintain them at this temperature. If there are many products that need to be refrigerated (after shopping for example), it is advised to upscale the temperature (temporarily). As it takes longer to properly cool large products, it is useful to find out which products are best stored in smaller portions.

Warm products should not be placed in the refrigerator, as this would cause the temperature to rise. The refrigerator is not capable of cooling warm products. A temperature rise in the refrigerator causes an increase of microbes in other products stored in the refrigerator. Therefore, leftovers are to be cooled down before storing them in the refrigerator (see 3.9.1.2). To prevent the temperature inside the refrigerator from rising as much as possible, it is also necessary to close the refrigerator door after taking out products as soon as possible, and to place the products back inside immediately after use. For example, instead of putting the milk on the table for lunch, pour the milk directly into the glasses and place it back into the refrigerator. The product does then not need to be cooled down again.

Each rise in temperature leads to a rapid increase in the number of micro-organisms. For some products this does not lead to direct health risks (milk for example). Products such as pate, soft raw milk cheese, raw meat, filet américain, fish, shrimps, cooked sliced meat, moist cake, and pre-cut vegetables on the other hand deteriorate. Some bacteria (such as *Listeria*) are capable of multiplying at 4 to 7 °C. If the temperature inside the refrigerator is often too high, the number of pathogenic micro-organisms can increase to levels causing food infection if the product is consumed.

Duration

Although the measures indicated previously gain some time, products stored in the refrigerator cannot be kept forever. By using the refrigerator (loading and unloading products) temperature variations occur allowing micro-organisms to multiply. 'Storage management' (see 3.4.2.1) is important inside refrigerators as well: check the 'THT' or 'TGT' dates on the packaging.

To prevent the shelf life of products from expiring, it is advised to gear the size of packaging or storage to their use (see 3.3.1.1). The contents of the refrigerator should also be 'managed' according to the FIFO principle: products that are stored the longest should be used first. Products which are partly used should be used first.

Before preparing and/or consuming perishable products, inspect the quality of the product in question. If its quality is dubious, it is best to throw it away. The 'perishable foods' appendix indicates the shelf life of most perishables inside the refrigerator.

Defective refrigerator

If the refrigerator is defective, for example due to a power failure, the inside temperature slowly rises. The higher it rises, the more the micro-organisms present (including possible pathogens) will grow, and products will turn bad after some time. By measuring the temperature of the products before switching the refrigerator back on you can check if they are still suitable for use or must be thrown out. Up to a product temperature of approx. 7 °C no

special measures are required. If the product temperature has risen to 10 - 15 °C perishables (products with a high microbial risk) must be thrown out. At temperatures over 15 °C, everything must be thrown away. If the quality of products is dubious, throwing them out is safest.

3.4.3.2 Packing

Risks: 1st priority

The refrigerator is a storage place for many different types of product: primary base material (raw vegetables, raw meat), processed products (cheese, fermented sausage) and cooked products (leftovers, cooked sliced meat). All these products have a different microbial contamination. Raw products are more contaminated than cooked products. Their capability for microbial growth also differs. If a cooked product is contaminated with a certain bacterium (possibly pathogen), that bacterium does not meet with competition from other bacteria and is therefore able to develop into unsafe numbers. A raw product can also contaminate another raw product.

As the refrigerator is a depot for all products mentioned and products are sometimes improperly packed, there is a risk of cross-contamination: one product transmitting bacteria to another. In the refrigerator this is usually not a problem. However, to products susceptible to *Listeria*, such as soft cheese, pate, cut vegetables, and sliced meat this is a problem. With other products the possibility of (cross-) contamination only develops when the product is taken from the refrigerator.

Control

Cross-contamination can be prevented by wrapping the products. This also benefits the product itself as it prevents it from drying out. Therefore, wrapping a product is more than placing it on a dish; it also means covering it. This way other products cannot be contaminated, and the product itself is protected against contamination too. The crisper compartment can serve as packaging for vegetables and fruit. Cut vegetables, on the other hand, should be placed elsewhere in the refrigerator, properly packaged.

Cross-contamination can also occur through leakage of raw meat, milk or soft drink bottles. Therefore, products that might leak should be placed at the bottom of the refrigerator. Do not place raw meat over prepared products (leftovers, deserts, and salads).

3.4.3.3 Cleaning

Leakage, product remains, packaging remains, and other visible dirt should be removed from the refrigerator immediately using kitchen paper or similar. Contaminated areas are to be cleaned using a dishcloth and cleaning agent.

Clean the complete refrigerator once a month. Preferably do this before doing the shopping, when the refrigerator is relatively empty. Prior to cleaning, all products are taken from the refrigerator and preferably kept in a cooling bag with freezer pack. Then the complete refrigerator is cleaned using a wet cloth and a (special) cleaning product. The drain hole for condensed water is also cleaned using a bottle brush. If there is a layer of ice around or inside the freezer compartment, this would be a good time to let it thaw. The ice layer decreases the refrigerating output of the refrigerator. After cleaning, the complete refrigerator should be dried with a clean tea towel.

All cleaning tools are to be rinsed and dried afterwards. Put the dishcloth and the tea towel in the wash.

While unloading and cleaning the refrigerator, it is advised to check the shelf life of each product. Are there any products which need to be used shortly or maybe thrown away?

3.4.4 Storage in the freezer

3.4.4.1 Quick-freezing: 2nd priority

If the core of a product is not frozen quickly enough, micro-organisms can keep on reproducing until the freezing point is reached. They may continue growing during or after thawing.

For quick-freezing the following aspects are crucial:

- Correct setting (with some freezers the capacity can be raised temporarily to speed up the freezing process);
- Not too many products at the same time;
- Products not too large and sizeable;
- No warm products in the freezer.

3.4.4.2 Defective freezer: 2nd priority

In the case of a power failure, the temperature inside the freezer and the frozen products will slowly rise. To determine whether the products (most frozen products are quite perishable) can still be kept, their temperature must be measured. If the product temperature is below 0 °C, the product can be replaced inside the (switched on) freezer. If it is between 0 and 4 °C, the products can be kept for some time (approximately 3 days), provided they are kept in the refrigerator. They are not to be quick-frozen again. If the temperature is between 4 and 10 °C, microbial growth has occurred and the product can not be kept long. Depending on the type of product, it should either be prepared immediately (thoroughly heated) or used within the day (provided it is kept refrigerated). If the temperature is over 10 °C, the risk of microbial growth is so high that the products are to be thrown out. (See also 3.4.3.1 Defective refrigerator).

3.4.5 Cleaning products

3.4.5.1 Risks and control: 2nd priority

Cleaning products and other chemical products are to be stored separate from foods. Leakage, negligence, or small accidents may cause foods to be contaminated with chemicals. If this happens unnoticed it could lead to health problems after consumption of this food (depending on the type of chemical compound).

Store these products in their original packaging and keep them away from children. It is not recommended that different products be mixed. Usually, this does not lead to better results, but it may have hazardous consequences (such as the release of hazardous gasses).

3.5 Food preparation: general

This paragraph deals with the possible hazards in food preparation in general, i.e. hazards which may occur during any type of food preparation. Paragraphs 3.6, 3.7 and 3.8 will deal with the specific hazards during preparatory activities, heating, and the preparation of cold meals respectively.

3.5.1 The kitchen

This paragraph is concerned with kitchen related hazards, i.e. surfaces, utensils, operations, and persons present.

3.5.1.1 Risks: 1st priority

In the kitchen there is high risk of contamination with micro-organisms. As various food products 'pass by' regularly, the kitchen (work tops in particular) is contaminated with the bacteria in that food. Contamination of the kitchen will probably cause cross-contamination: other food products are contaminated as well. But the user plays an important role in this. Many micro-organisms exist on the hands and are transmitted to foods. Hands can also transmit bacteria from one food product to another. Coughing and sneezing can also contaminate the kitchen. Domestic pets are carrier of zoonotic agents as well (bacteria, viruses, and parasites that are 'carried' by animals and cause health problems in people). As domestic pets have a different 'personal hygiene' from people, it is very likely that, if domestic pets are in the kitchen, this area is contaminated too, and so will be the food. Pests (cockroaches, flies) can also cause cross-contamination: they transmit micro-organisms flying from waste to food.

The type of product contaminated, shelf life and storage temperature determines the possibility of growth of the contamination and probability of food infection.

Control

One of the basic rules for kitchen hygiene is that food remains, waste and dirt be cleared away and thrown out as soon as possible. This prevents micro-organisms from growing and causing contamination. In addition, it keeps out pests. For that same reason, all food products are to be packed if not used immediately.

Domestic pets are a source of various micro-organisms. When they come into contact with food, they may stay there and/or develop⁴ and lead to food infection. Therefore, it is best not to let pets in the kitchen. For good reason the presence of pets in professional kitchens is strictly forbidden. In the private household, however, it is almost impossible to keep domestic pets outside the kitchen, especially when the kitchen is open. Pets certainly do not belong on work tops. If this cannot be avoided, extra cleaning of the work tops (the pet may have/has jumped on) is required before food is prepared. (see also 1.5)

⁴ Viruses and parasites do not develop in food products, but they could cause infection

3.5.2 Cleaning

3.5.2.1 *Work tops*

Because of the continuous contamination of kitchen and kitchen tools, it is vital that cleaning occurs regularly. If there is a risk of domestic pets entering the kitchen, the sink and surrounding counter (and other work tops) should be cleaned with a wet dishcloth and dishwashing product or cleaning product before preparing food. Work tops should also be cleaned directly after working with products that could cause severe microbial contamination (raw meat and raw vegetables). Furthermore, it is recommended that the work tops are cleaned after food preparation. Drying them afterwards is just as essential.

3.5.2.2 *Kitchen utensils*

Apart from work tops the kitchen tools, such as the chopping board, knife, dishes, cutlery, work top, dishcloth etc., are also contaminated by food preparation. Using these tools causes contamination with bacteria existing on foods such as raw meat and vegetables. If a tool is used for another food product, bacteria from the first product are transmitted to the second. Particularly materials used for the preparation of meat form a major source of contamination. Therefore, knives and chopping boards (and all other materials used), which have been in contact with raw meat, are to be rinsed with hot water and treated as dirty dishes afterwards (see 3.11). If these tools are to be reused immediately, they must be washed in hot water and soap first. So, washability is an important issue when buying new kitchen tools and appliances.

An alternative to repeated washing of one chopping board during food preparation is the use of several chopping boards. The used (contaminated) chopping board can be placed with the other washing-up while a clean one is available for the next job. It might also be useful to dedicate tools to one type of product (vegetables, meat, and bread) and to keep them apart by using colours.

Kitchen utensils such as a mixer, hand blender, or a can opener are difficult to clean. Therefore, it is advisable to let them soak in hot water and soap for some time before adding them to the washing-up. With utensils like these it is crucial that they are dried properly.

Add washable components of kitchen appliances to the washing-up. Non-washable components can be cleaned with a damp towel or dishcloth. The microwave oven for instance should be cleaned with a damp cloth or towel whenever visible dirt (product remains) is observed. The upper inside wall in particular is not to be forgotten. It is also recommended that the entire microwave oven be cleaned regularly. Do not forget to dry afterwards.

As a dishcloth is used for all kinds of quick cleaning jobs, it is likely to become contaminated. The number of micro-organisms rapidly increases because it stays wet/damp at room temperature for a long time, especially when put away in a ball. Rinse and wring a dishcloth after use and hang it up so that it can dry. Refresh dishcloths daily and wash them at 60 °C using an all-in-one detergent (powder type with bleach).

It is common knowledge that sponges are also used regularly for cleaning jobs in the kitchen. Sponges stay wet for long, are difficult to clean thoroughly (by putting them in the washing machine they get torn quickly) and allow micro-organisms to grow. Sponges used in the kitchen may form a serious source of contamination. In order to prevent this risk, it is advised not to use sponges as a dishcloth for all sorts of clearing, cleaning and wiping jobs. If a scourer was used frequently to scour, it would be better to use a scouring cloth (without sponge), because it dries quicker.

If a sponge is preferred, a special washing-up liquid or diluted bleaching agent - provided they are used properly - may help to reduce the number of micro-organisms in the sponge. This Hygiene Code does not recommend the use of sponges as a kitchen tool (except for cleaning windows).

3.5.3 Personal hygiene

People form a major source of food contamination. People carry all sorts of micro-organisms and are capable of transmitting them to food. They are also capable of transmitting micro-organisms from one product to another. Therefore, personal hygiene is crucial. Firstly, the hands must be washed before starting to prepare food, but also when seriously contaminated products (such as raw meat) are touched during the preparation. When preparing food it is advisable to use forks, spoons, tongs etc., instead of touching the food with the hands.

On skin which is covered by jewellery micro-organisms build up. In the event of a lengthy contact with products which carry a high microbial risk (such as minced meat or dough after kneading) jewellery should be removed before washing the hands and should not be worn until after the hands have been washed following food

preparation. In this way, these products are not contaminated and micro-organisms can not be transmitted from them.

During food preparation, contact with the face or domestic pets is to be avoided. Cover your mouth when coughing or sneezing and wash the hand(s) afterwards. If the skin on the hands is broken, cover the area so that no fluids from the wound or blood leak through. Kneading minced meat or dough or similar operations where extensive contact with the product takes place, is not recommended. On the one hand the product would get contaminated (which can lead to food infection) and on the other hand the wound would (which can lead to wound infection).

3.6 Food preparation: preparatory activities

3.6.1 Thawing foods

3.6.1.1 Risks: 1st priority

If frozen products (particularly meat) are thawed at room temperature, after some time, the outside will be warm while the inside is still frozen. The relatively high temperature on the outside will allow micro-organisms to reproduce freely.

When thawing meat, moisture is released (drip). This drip not only contains nutrients from the meat, but also many bacteria. Contamination of other products through this drip must therefore be prevented.

Control

To thaw products they are best placed in the refrigerator. Here the temperature will not rise to levels allowing bacteria to grow on thawed parts. A practical drawback of thawing in a refrigerator is that it takes longer (see also 3.7.2.3). Therefore, it is recommended that meat be taken from the freezer the night before it is to be used.

Alternatively, frozen products such as meat can also be thawed in a microwave oven. However, in this case the product must be prepared immediately afterwards.

Always place frozen meat on a dish or a saucer to prevent the drip (severely contaminated seepage of meat) from leaking into the refrigerator or microwave oven. Cover it to prevent the meat itself from getting contaminated. After thawing, rinse the drip off the saucer using hot water, and rinse the sink as well. Then place the saucer with the washing-up.

3.6.2 Handling raw material (such as meat, vegetables)

This paragraph deals with general handling in food preparation, such as selecting, washing, handling (peeling, cutting, grinding, grating, etc.) of raw material.

Risks

When selecting, washing and handling raw material, the various types of material may contaminate one another; washed raw material can be contaminated by unwashed raw material. By reusing utensils for different raw materials, micro-organisms can be transmitted. The person preparing the raw material can also be the source of contamination by not washing the hands, coughing or sneezing. Depending on the nature of the product, but also on the preparation to follow, these types of contamination may lead to food infection.

Apart from contamination in the kitchen, microbial growth can also originate from bacteria already present in the product. This may happen if the raw material is left in the kitchen - at room temperature - too long before (further) processing.

3.6.2.1 Control: 1st priority

In order to prevent cross-contamination between various raw materials and meal components, they are to be separated. This applies in particular to products that will not be heated, but used raw. Plan the various operations in such a way as to prevent contact between raw and processed products and waste. Do not place raw materials next to one another (particularly meat next to vegetables) and divide the work top into a section for unprocessed food and one for processed food if possible. Use ample water to wash raw materials (vegetables) to rinse off dirt and micro-organisms. Vegetables from the kitchen garden are to be washed with extra care (also see 5.9.2.5).

When there is a pause during food preparation, the ingredients vulnerable to microbial growth (such as raw meat, salads) are to be placed in the refrigerator. If consumption is delayed, prepared cold meals are best kept refrigerated until served. Particularly in the case of large quantities of food (for festive meals for instance) it is important to have a clear view of which products and meals need to be refrigerated and the available space in the refrigerator.

For the processing and preparation of food all the recommendations mentioned earlier apply (see 3.5).

3.6.2.2 *Risks and control: 2nd priority*

Preparatory handling is essential for the removal of micro-organisms as much as possible. Severely contaminated or rotten raw materials (such as vegetables) are best thrown away immediately. Ensure that products are properly washed. Avoid contact of the product with the outside of the packaging material (See also 3.6.2).

3.7 **Food preparation: heating**

During preparation many foods are heated. The first part of this paragraph will discuss the general purpose of heating foods and the hazards involved. Paragraph 3.7.2 will then discuss the hazards involved in the preparation and heating of certain products or meals. Thirdly, paragraph 3.7.3 will describe different heating methods.

3.7.1 General

3.7.1.1 *Risks: 1st priority*

The main purpose of heating foods is to make them digestible. Furthermore, heating is a preparation stage which in many cases is essential to reduce the number of micro-organisms in the product. Raw products contain many micro-organisms, some of which may cause food infection or intoxication after consumption. If a product is heated insufficiently (not long enough or at too low a temperature) the microbial contamination can still be sufficient to cause an infection. In favourable conditions, the surviving micro-organisms may start reproducing again after heating. Although the amount of pathogens immediately after heating may not be sufficient to cause an infection, this might still happen at a later stage depending on the temperature and time between preparation and consumption.

Control

In order to be sure that the number of micro-organisms is reduced such that the product or meal can be consumed safely, the product should be 'heated through and through'. This means that the core of the product should also be sufficiently heated (75 °C)⁵. Various combinations of time and temperature exist to achieve this. The selected time/temperature combination often depends on the type of product and its size. A large piece of meat cannot be properly heated in a short time by high temperatures as this would burn the outside, while leaving the core raw and allowing contamination to occur. Particularly composite dishes and products, such as minced and rolled meat, macaroni and ready-to-use meals or non-composite products with intrinsic contamination (parasites), thorough heating is vitally important.

It is recommended to check the temperature of products (large ones in particular) by using a proper thermometer. By sticking the thermometer into the core of the product the core temperature can be determined.

3.7.1.2 *Insufficient heating for a purpose*

Some products are considered tastier when they are not thoroughly heated. To some products, however, this involves a microbial risk. Similar products (in this case egg, tartar, filet américain, bean sprouts, and alfalfa) may contain unsafe number of pathogens, which may cause food infection when eaten. If the consumer wants to be served such products, it is strongly recommended that he is particularly careful with regards to the quality of the raw material. When a product is heated, it should either be consumed or be refrigerated immediately afterwards. And the same rule applies: when in doubt, don't eat it.

High-risk groups (the very young, the elderly, pregnant women, and immune-compromised people) are advised not to eat insufficiently heated products at all, as the consequences of a possible food infection can be very serious indeed.

⁵ Particularly applies to composite products; does not apply to whole pieces of meat (for example steaks), where the contamination exists on the outside only.

3.7.2 Products and dishes

3.7.2.1 Nitrate-rich vegetables

Some vegetables are relatively rich in nitrate. These are roman lettuce, beetroot, blanched celery, Chinese cabbage, kohlrabi, pak choi cabbage, purslane, turnip tops, all salad types, spinach, conical cabbage, and fennel.

Risks: 1st priority

Nitrate in itself is not harmful to human beings, nitrite is. The conversion from nitrate into nitrite takes place in two ways:

- By the human body itself
- By micro-organisms in leftovers of nitrate-rich vegetables.

Nitrite is harmful to human beings. Having too much of the above mentioned vegetables will negatively effect the transportation of oxygen through the blood. Babies and infants are particularly sensitive to this, because in the young the conversion of nitrate into nitrite is higher.

Furthermore, there is evidence suggesting that nitrite also effects the adrenal cortex and the forming of nitrosamines.

Control

If the consumption of normal portions of nitrate-rich vegetables is restricted to twice a week, there will be no harmful effects. Do not keep them as leftovers and do not feed them to babies under the age of 6 months.

3.7.2.2 Prepared meals

Risks and control: 2nd priority

Leftovers are usually fried in cooking or frying pans using fat. The odds are that the heating temperature gets too high. The food will burn, witness the back parts, edges, or crust. Unwanted chemical changes occur. The Maillard compounds, PAHs, and heterocyclic compounds that occur are detrimental to the health (forming of carcinogenic substances). To thoroughly heat leftovers, it is advisable to divide the meal into small portions, not to overheat, and to stir constantly.

3.7.2.3 Thawed products

Risks and control: 2nd priority

As described in paragraph 3.7.1.2, heating foods is an essential preparatory step for killing micro-organisms. After thawing raw products or (composite) meals they are to be thoroughly heated or reheated. Micro-organisms are able to survive freezing. In this case this is important, because the products or meals may not have been thawed completely. Therefore, a product can be cooked on the outside, while the core is insufficiently heated. If the product is not thawed completely, there is a risk that the heating process does not inactivate micro-organisms existing in the core. As the core temperature has risen slightly, micro-organisms may even start to grow. For proper thawing methods, see 3.6.1.1.

3.7.2.4 Natural toxins

Risks and control: 2nd priority

Some foods contain natural toxins that are inactivated by heating. Examples are all pulses, haricot beans, green beans, soy and possibly beansprouts. If heated insufficiently consumption leads to intoxication (for instance indigestion). When preparing these products one should be familiar with the required cooking time of each product type.

3.7.3 Heating methods

3.7.3.1 Deep-frying

Risks 1st priority

For deep-frying, the oil is heated up to about 180 °C. At this temperature products are cooked, but they can be burned as well. Product remains and crumbs in the oil become so hot that they burn. If the frying oil is heated too long and too hot, the frying oil itself will burn. These combustion reactions are accelerated if the oil has been in

contact with metal (damaged inside of frying pan). As metal catalyses these reactions, combustion products occur at normal frying temperatures as well. These combustion products contain carcinogenic substances.

2nd priority

If the temperature of frying fat is too high, more reactions than the chemical ones in the fat itself occur. For example, the outside of the product itself undergoes chemical reactions (for instance by polymerisation), which are detrimental to the health. The same happens when a product is fried too long (even if the temperature is ok).

Too high temperatures may result in the outside of products such as spring rolls, meatballs, or hamburgers being done (or even burned), while the inside is still insufficiently heated. Any micro-organism inside the product will not be destroyed.

Therefore, a correct frying temperature is vital. See also 3.7.3.1.

3^e priority

The temperature of frying oil can be too low due to incorrect temperature setting or insufficient heating, but also by overloading of the oil (too many frozen products at once).

If the frying temperature is too low (optimal temperature is approx. 180 °C), the food product will absorb relatively large quantities of oil. Although consumption thereof would be ill advised by nutritionists, there is no hygiene hazard. There is however a risk that the core is insufficiently hot (at much too low temperatures or too short frying time) allowing micro-organisms to survive.

Control

Frying fat or oil should be renewed regularly. Frying fat, which has already undergone combustion reactions, will deteriorate further when reheated. If frying oil is re-used, it is advisable to strain the oil while still liquid after use to prevent pollution by product remains. As not all types of pollution can be strained out, this would be another reason to renew the oil regularly.

If a frying pan does not have an automatic temperature control (for instance when frying on the stove) one should take care that the temperature does not get too high. Frying is not about 'the hotter, the better'. Check the packaging for the correct heating temperature of the frying oil. Once the oil has reached the required temperature, maintain the heat at just the right level for the oil to stay warm. If you throw in a piece of bread and it starts to fry and brown, the temperature of the frying oil is correct. It is recommended that a thermometer be used.

Use a frying pan which is not damaged on the inside, as metal will catalyse combustion reactions. Also look out for damage to the pan during frying.

3.7.3.2. Microwave oven

Risks: 1st priority

The microwave oven uses electromagnetic radiation to heat foods. Products with a high water content need more energy than dry products (because of the high specific heat of water). These products therefore take longer to reach a high temperature.

The drawback of this principle is the possibility of so-called 'cold spots' (insufficiently heated spots in the product). This is not prevented by the use of a turntable alone.

As these 'cold spots' are not (or insufficiently) heated, micro-organisms may survive, and this can lead to a food infection, which may occur immediately, or after the micro-organisms have had the opportunity to multiply.

Control

The use of a microwave as the only heating source in the preparation of high-risk products is not recommended. If a recipe indicates that meat should be prepared in the microwave oven, pre-cooking the meat first is recommended. Cutting the product(s) in small portions first and turning and stirring them regularly prevents cold spots. Stirring or turning is also recommended for ready-meals consisting of various components: the driest components (such as rice) will be warm sooner than the sauce.

3.7.3.2 *Using water*

Risks and control

2nd priority

Heating methods such as cooking, blanching, braising, smothering, steaming, or poaching are sometimes carried out for shorter periods or at temperatures below 100 °C. The duration and temperature of a heating process should, however, be sufficient to eliminate pathogens.

Sufficient water should also be present. If not, the product will burn causing chemical reactions inside the product that are detrimental to the health.

3rd priority

If the cooling rate after blanching is inadequate, spore formers (activated by the heat shock) will multiply. Cooling down should be a quick process (see 3.9.1.1).

3.7.3.3 *Frying and baking*

Risks and control

2nd priority

It should be realised that adding water to a frying pan lowers its temperature to 100 °C at the most, compared to a frying temperature of some 185 °C in oil or fat. The consequence is that the meal needs to be heated longer in order to reach the proper temperature.

If a product is not turned during heating, micro-organisms on top of the product might survive like with a fried egg.

As stir-frying is usually only a short heating process, heating may be inadequate. This is particularly important to meat. Therefore, it is recommended that meat be adequately heated first, before adding the vegetables.

Some vegetables contain natural toxins that can only be inactivated by proper heating. When stir-frying there is a certain risk that the vegetables - for the benefit of their crispiness - are heated not long enough. Consumption can cause intoxication. Therefore, ensure sufficient heating (through and through). See also 3.7.2.4.

3rd priority

During frying and stir-frying there is a small risk of airborne contamination. This type of contamination is likely to be caused by the person cooking the meal. Personal hygiene and adequate heating are essential (see 3.5.3).

3.7.3.4 *Barbecue, oven, and grill*

Risks: 1st priority

When barbecuing, but also during other preparation methods performed while eating (such as when using table grills and fondue Bourguignonne), there is a considerable risk of cross-contamination of cooked ingredients and raw products. As such meals are often quite lengthy, the unprepared (raw) materials are outside the refrigerator for a long time and the risk of microbial growth as a consequence of this is substantial. In addition, the preparation time is often disregarded under these circumstances and it is likely that ingredients are not properly cooked.

Control

It is recommended that prior to barbecuing, sizeable pieces of meat, like drumsticks, be pre-cooked in water. When barbecuing it is particularly vital that raw and cooked products be separated. Preferably use utensils like plates and forks, for one type of product only (raw or prepared).

Do not place the complete food supply on the table, but serve small portions and fill up if required. This way, products are not left on the table at too high temperatures for a long time.

Risks and control: 2nd priority

If the oven temperature is too hot, a product may be done or even burned on the outside while the inside (the core) is not. Micro-organisms could therefore survive the preparation and (depending on the following step) reproduce and cause food infection.

If the oven temperature is too hot, or a product is heated (grilled) on one side for too long, the product will eventually burn. The chemical compounds resulting from the combustion reactions are detrimental to the health.

It is recommended that the oven not be preheated at too high a temperature and that the product be turned regularly if possible to prevent the meal from burning.

3.7.4 Further processing

By further processing we mean those processing stages after a dish has been heated to enhance its taste and looks, to garnish it or to divide it over plates or dishes.

3.7.4.1 Risks: 1st priority

Proper heating (through and through at 75 °C) kills most micro-organisms. Some micro-organisms, however, produce spores that are capable of surviving heat. These spores can develop if a product is not kept at the right temperature (but at room temperature for instance) before it is served.

Apart from these spores, which have to germinate first in order to be able to multiply, the product is free of micro-organisms. This makes the product safe for consumption, but at the same time extra vulnerable to new contamination. A micro-organism, which is introduced to a product, e.g. the *Staphylococcus aureus* after sneezing, is free to develop: that bacterium will not encounter any competition in cooked food.

After heating, contamination of products can be caused by:

- Persons
- Utensils used for the after-care of meals
- (Work) tops
- Garnish added to the product (especially raw or half-heated products)

If the temperature and time are favourable, micro-organisms in these products (depending on the type of products) can still develop into infectious numbers.

Control

As in each phase of food care, personal hygiene is important during the final processing stages of food as well. See 3.5.3. Use clean utensils and, if used for different raw materials, wash them in between (see 3.5.2).

As garnish is often raw material (e.g. parsley, herbs, egg white, fresh fruit, and frosting on cold meals), it increases the risk of contamination. If the garnish is added well in advance of serving the (cooked) meal and it is not kept at the correct temperature (over 65 °C), the micro-organisms added may reproduce. In order to prevent this, it is advisable to add garnish right before the meal is served.

3.8 Food preparation: cold meals

Cold meals are meals which are served (serving temperature below 12 °C) and consumed cold. When preparing cold meals there are a few specific hazards to keep in mind. They will be covered in the following paragraph.

3.8.1 Risks and control: 1st priority

Proper cooling stops or reduces microbial growth, but does not destroy them. During the preparation and (possibly) during storage of refrigerated products, temperature rises may occur. The degree of microbial growth caused by a rise in temperature depends on the contamination of the product (quantity, type), the type of product, and the temperature.

If microbial growth has risen to infectious numbers, the product in question will not become less hazardous in the next cooling step!

Control

As indicated previously, it is important to prevent foods from becoming contaminated. This also applies to refrigerated products, because each temperature rise may lead to microbial growth. In order to prevent cross-

contamination 'kitchen hygiene' and personal hygiene during the preparation of food are a prerequisite (for explanation see 3.5.1 and 3.5.3). When preparing cold food, product contamination can be reduced by paying attention to the quality of the ingredients and cleaning and/or washing them before use. If the quality of the ingredients is poor, the product (the cold meal) will probably be off soon.

Cold meals are not only served and eaten chilled, but also prepared chilled. The idea is that the meal undergoes as few temperature rises as possible. Therefore, the preparation time (in normal temperature kitchens) is to be kept short. If one of the ingredients has to be heated first (such as egg), ensure that this ingredient is refrigerated quickly after heating. Until properly refrigerated the ingredient can not be added to the meal.

It is advisable to use cold meals directly following preparation (do not let the temperature rise over 12 °C before consumption). If this is not feasible or desired, the meal should be kept in the refrigerator in the mean time. In general, refrigerated meals can be stored up to 3 days maximum, provided they are properly refrigerated.

3.8.2 Risks and control: 2nd priority

When preparing cold meals it is important to use clean utensils. When re-using utensils, wash them in between. Also see 3.5.2.2.

Ingredients that require heating before they can be added to a cold meal (for example eggs) must be heated thoroughly. Otherwise, pathogens will survive the heating and be transmitted to the cold meal by the ingredient. This does not necessarily cause health risks, but it will if the meal is exposed to too high temperatures/time – a combination thereof during processing or storing of the meal. Also see 3.8.1.

In order to prolong the shelf life of cold meals, growth-inhibiting substances (salt, vinegar) are added. Growth inhibition by means of cooling remains essential for the shelf life of products.

3.9 *Keeping remains and opened packaging*

Some foods or meals are not finished up in the preparation of food or during consumption and the remains are stored for later use. This paragraph describes the hazards involved in the storage of prepared meals (leftovers and such). It also deals with the hazards of storing foods in opened packaging.

3.9.1 Prepared meals

3.9.1.1 *Risks*

The first important factor is the speed at which a product is cooled down after preparation. If a heated product chills too slowly, the meal will take a long time to cover the temperature track from 50 to 10 °C. At such temperatures the spores of possible pathogens (which survive a normal heating process!) have more than enough time to develop into infectious numbers. If heating was incomplete, not only spores but also vegetative cells will have survived the heating and start reproducing. Also see 3.7.1.1.

The second factor is the risk of microbial growth during the storage of prepared meals. Microbial growth is connected with possible contamination, storing temperatures and duration and possibly involves the production of toxins. Meals containing rice are particularly susceptible to the production of toxins, which are not inactivated by heating (warming up) (*Bacillus cereus* toxin).

The conversion of nitrate into nitrite as described in paragraph 3.7.2.1 is considerable when the vegetables are cooled slowly or kept outside the refrigerator as leftovers.

3.9.1.2 *Control*

Cooling

1st priority

In order to prevent the proliferation of spore formers it is essential to cool dishes down fast. Sizeable products take longer to cool down. Therefore prepared meals should be divided into small portions. Not only will the product cool faster; later reheating is easier too. If portioning is not possible or undesired, cool the product by placing the storage packaging in a tub with water and ice cubes. Stirring the product regularly will ensure even cooling. Add new ice during the process. Ensure that the meal can be put in the refrigerator within an hour.

If during cooling down a meal is covered with a lid the enclosed air will function as isolation. The meal will not cool as fast and condensation occurs. When cooling meals, do not cover them (completely); merely prevent contamination.

When intentionally preparing two meals at the same time (for example when cooking a meal for two days) do not serve the portion intended for the following day. This will increase the risk of contamination. Transfer the remains with clean utensils (do not use your hands). In order to prevent (cross-) contamination during storage pack the meal in a small container for instance.

2nd priority

As during each stage of food care personal hygiene is also important during the cooling stage. See paragraph 3.5.3.

Small portions can be left to cool at room temperature, although they should not be left outside the refrigerator for long. Ultimately microbial growth will occur and pests are attracted. Always place the food away from domestic pets (they can cause contamination by eating from it).

Storage

1st priority

For the safe storage of prepared meals they should be stored refrigerated, that is to say: packed and in the refrigerator. Most prepared meals stored in a refrigerator cannot be kept longer than 3 days. If prepared meals are deep-frozen (-18 °C) after they have been cooled down they can be kept for approximately one month.

As storing prepared nitrate-rich vegetables causes considerable risk of an increase in nitrite, it is advised not to keep meals or leftovers containing nitrate-rich vegetables. Also see 3.7.2.1.

2nd priority

Cooked leftovers should be kept in small containers in the refrigerator separated from raw materials or food remains (such as salad). If not, the cooked meal could be contaminated by the uncooked meal or product causing the micro-organisms in the cooked meal to reproduce.

Fish is an extremely perishable product. Both unprepared fish remains in opened packaging as well as prepared fish remains should not be kept in the refrigerator longer than one day.

3.9.1.3 Risks: 1st priority

A food product of which the packaging has been opened will perish before the 'THT' or 'TGT' date indication (this also applies to sterilised milk). The product will decay and will not be suitable for consumption after some time.

Control

Once the original packaging of a food product is open, its shelf life will end faster. The label on the packaging contains information on how the product should be kept after opening. Many products should be kept in a cool place, in any case when the label says 'keep cool after opening'.

It is recommended that open packaging is resealed, or, if this is no longer possible, that the contents are packed in a storage container.

In general, food products (that are not extremely perishable) can be used within three days provided the 'TGT' or 'THT' date does not expire in the meantime (see 3.3.1.1). Long-life pickled products (such as pickles, pearl onions, and herb vinegar) and candied products (jam) can be kept for approximately one month after opening. As soon as vinegar (or products containing vinegar) shows yeast (white traces) the product should be thrown away. Jam (or bread) contaminated with fungi is to be thrown away as well, but hard cheese can still be used if the fungus and surrounds are cut out.

3.9.1.4 Risks and control: 2nd priority

Remains from tinned food are to be kept in a storage container. Once opened, the metal of uncoated tins will form a chemical reaction with the product causing lead and tin to enter the product. Consumption thereof is unhealthy.

3.10 Reheating, serving, and consuming

This paragraph is about reheating prepared meals. It also covers the relevant hazards connected with serving and consuming meals.

3.10.1 Reheating prepared meals

3.10.1.1 Risks: 1st priority

If a prepared meal is cooled, packed, and refrigerated quickly (under ideal circumstances), there is no risk of microbial growth in the meal. It is assumed, however, that the actual circumstances are rarely ideal. Especially when the meal has previously been served (leftovers), microbial contamination and growth is likely. Also see 3.9.1.1.

If the reheating process is inadequate, it is likely that the spores of spore forming pathogens (which have survived the initial heating stage during the preparation) will be activated by the heat shock and start to reproduce. Vegetative cells that may have survived the initial heating (for instance because the meal has not been thoroughly heated) can start reproducing as well. Once stored, prepared meals (particularly meals containing rice) cannot be reheated and stored and reheated again, as some spore formers (for example *Bacillus cereus*) produce heat resistant toxins.

Control

In order to ensure the safety of prepared meals (particularly leftovers) thoroughly reheating the meal before consumption is advisable. The same goes for ready-to-use refrigerated fresh meals. See the preparation instructions on the packaging. The core temperature should be at least 75 °C and the meal should be used directly after reheating. If after reheating the meal is not used completely leftovers are to be thrown away.

3.10.2 Serving and consuming

3.10.2.1 Risks: 1st priority

In connection with serving and consuming, the main risk is the occurrence of microbial growth caused by a too long period between the two operations. Once served, the meals are kept at ambient temperature whereby warm meals cool down and cold meals heat up. The longer this takes, the more micro-organisms will grow.

Control

If it is clear that a meal will not be consumed immediately, it is advisable to delay serving. Keep the meals at serving temperature: hot meals over 65 °C and cold meals refrigerated (below 7 °C) or in any case below 12 °C. Usually this means that cold meals if left outside the refrigerator will have to be used within the hour. This rule of thumb applies when the ambient temperature is around 20 °C. At higher ambient temperatures (for instance in summer) heating time will be less.

When serving a sumptuous meal or snacks during a party, it is likely that the products will not be used up at once (one or two rounds). In such cases it is advisable to serve small quantities. The rest of the food can be kept at the correct temperature in the kitchen. Hot meals can be served hot using an au-bain-marie. Be sure to set the au-bain-marie to the correct temperature. A temperature below 65 °C will be ideal for micro-organisms to reproduce.

3.10.2.2 Risks and control

2nd priority

As with each phase of food processing, serving and consuming need specific personal hygiene practice as well. See 3.5.3.

If a meal is served on a hot plate, it should be noticed that heating is not set too high. The meal might burn causing harmful reactions (Maillard compounds, PAHs and heterocyclic compounds).

3rd priority

Serving and consumption should take place with clean tools to prevent cross-contamination. Practice personal hygiene to prevent contamination of the food by infected hands or coughing and sneezing. The same applies when clearing the table. If the hands are contaminated by contact with food remains, they are to be washed. This

prevents the contamination from spreading through the house. Food remains can contain micro-organisms and form a good breeding ground for reproduction. They may also attract pests.

3.11 Washing-up

3.11.1 Risks and control

1st priority

Washing-up is a cleaning method aimed at the removal of food remains and micro-organisms. The combination of high temperature, washing-up liquid, and mechanical force removes or destroys the micro-organisms. If all organic material (food rests) - which may feed the micro-organisms - is removed and clean dishes are dried, any surviving micro-organisms may still die and will not be able to reproduce in any case. Prior to washing-up leftovers are to be scraped off insofar as possible.

The use of a dishwasher is recommended. This decreases the risk of cross-contamination in the kitchen and reduces the number of micro-organisms better, compared to washing-up by hand. With a dishwasher there is no need to pre-rinse the dishes.

If the use of a dishwasher is impossible or inappropriate washing-up by hand is required. Use clean, hot water with a washing-up liquid at a (starting) temperature of approximately 50 °C. Preferably use the highest possible water temperature; when rubber gloves are used, higher temperatures can be stand. Use a washing-up brush to clean the dishes in the washing up water. Ensure sufficient mechanical force to remove all food remains.

Although washing by hand does not always require pre-rinsing as well, pre-rinsing in lukewarm water of (parts of) extremely dirty or fatty dishes obtains better result. As correct water temperature and clean washing-up water are of great influence to the result, the washing-up water should be changed regularly. Post-rinsing for sanitary or safety reasons is unnecessary, as possible washing-up liquid residues are not harmful. If post-rinsing after all, be sure to use clean water.

After washing-up the dishes should be dried before placing them in the cupboards. Dishes can be left to dry by air as well as by using a tea towel. Be sure to hang up the tea towel after use. Do not re-use the tea towel until completely dry.

While washing-up and drying the dirty and clean dishes should be kept well apart to prevent the dirty dishes from contaminating the clean dishes.

Tools used for the preparation of baby food (babies younger than 6 months), particularly bottles and teats, should be washed-up and thermally disinfected daily using water or steam (see 4.10.3.1).

3rd priority

Be sure to use the correct order when (pre-rinsing and) washing-up: handle according to the extent of soiling, starting with the least soiled material. In general, the correct order is glassware, cups, cutlery, kitchen utensils, plates, lids, and pans. Practice personal hygiene when drying and clearing away, to prevent recontamination of the materials. Do not clear them away until properly dried.

3.12 Waste

3.12.1 Risks and control: 2nd priority

Waste and food remains which can no longer be stored, are to be thrown away immediately after preparation or consumption. If not, micro-organisms will grow causing a greater risk of contamination. It also attracts pests. Therefore it is vital to close the rubbish bin properly.

When disposing of waste the hands are contaminated either by the waste or by the rubbish bin. Sometimes it is better to safe up a few items and throw them away in one go, in stead of throwing away each item one by one touching the rubbish bin frequently. After direct contact with severely contaminated waste or the rubbish bin, the hands should be washed. As the rubbish bin is a frequently used object, it is constantly contaminated. The lid of the rubbish bin should therefore be cleaned regularly (once a week at the least). The rubbish bin itself should be regularly cleaned as well.

The longer waste is stored, the higher the levels microbial contamination. This increases the risk of contamination. Therefore, waste should be dumped frequently. Also see 5.10.

4 Personal and sanitary hygiene

4.1 Action points

This paragraph lists the control measures or action points for all operations involving personal and sanitary hygiene based on a hazard analysis and risk estimate with high priority.

Read the label and instructions for use

- Read carefully the instructions for the use of tampons
- Read the instructions for use of contact lens solutions.

Keep everything in the house dry

- Dry the walls and floor after taking a shower
- Ventilate the bathroom after taking a shower or bath
- Change sanitary towels and tampons regularly
- Dry feet well after washing
- Dry the bathroom well after cleaning.

Prevent (cross-) contamination

- Cleaning tools can be decontaminated by washing them in the washing machine at 60 °C using an all-in-one detergent, by boiling them or by using a chemical disinfectant.
- Bodily fluids such as faeces, mucus and aqueous humour, saliva, urine and vomit should be removed immediately and contaminated surfaces cleaned. The cleaning tools used for this should be washed at 60 °C using an all-in-one detergent.
- With (new and existing) ear piercing and other type of piercing and with new tattoos, fluid from wounds and/or pus can discharge, which will need to be cleaned away regularly.
- When coughing or sneezing cover the mouth with the hand. Preferably use paper tissues and wash the hands afterwards if possible.
- Regularly change the bathroom towel.
- Textiles which are potentially contaminated with pathogens, such as underwear, cloths, tea towels, towels and sheets should be washed in the washing machine at 60 °C using an all-in-one detergent.
- Skin infections should be treated with disinfecting soap/special-cleansing product.

Wash hands often and properly

- Wash hands with water and soap:
- After a visit to the toilet
- Before and after applying sanitary towels or tampons
- After touching a pet
- After touching dirty textile
- After touching the rubbish bin
- After touching raw materials
- After changing a baby
- After touching bodily fluids
- Before inserting or cleaning contact lenses
- Before and after treating skin infections.

Regularly clean and dry

- Clean the toilet regularly.
- Clean the bathroom regularly. Disinfect on medical grounds if necessary.

Pay extra attention to hygiene with babies

- Buy washable toys
- Clean the location where the baby was changed if necessary
- Boil the teat daily during the first 6 months.

Other

- Brush the teeth twice a day
- Do not cut toe nails round
- Prevent wounds from staying wet and use an absorbing dressing if necessary.

4.2 Introduction

4.2.1 General

This chapter describes the hazards involved in personal hygiene, sanitary hygiene (toilet and bathroom) and textile used.

4.2.2 Hazards

Contamination with pathogenic micro-organisms is a health hazard, because it can cause an infection. There is no infection without prior contamination. Contamination can be person-related as well (for example resident skin flora such as *Staphylococcus aureus*). Irritation is usually connected to the skin. Irritated skin is more susceptible to infection. An inflammation is the physical reaction to an infection.

Allergies (particularly nickel allergies) can also cause irritation and inflammation. Although mentioned in this document, they are not included in the risk estimate.

4.3 Hand care

4.3.1 Risks: 1st priority

When washing the hands there is a risk of cross-contamination. Someone who washes the hands starts the washing process with contaminated hands and the hands may even still be contaminated afterwards if they are not washed properly. Contamination of the materials used is likely, and will frequently occur. Contamination may occur through the following routes:

- contaminated tools such as soap dish or nail brush
- the water tap
- the towel.

The consequences of this microbial cross-contamination may be insignificant, but can still cause illness. Hand to mouth contact may lead to the ingestion of pathogenic micro-organisms, which can then cause an infection. The pathogens can also be transmitted directly from one person to another or indirectly through contact with surfaces elsewhere in the home. If contaminated hands touch food, the pathogenic bacterium can cause a food infection given sufficient time and a sufficiently high temperature for multiplication.

The skin under jewellery is always more contaminated than other parts of the skin. Soils (i.e. micro-organisms) are easily trapped in open-work rings causing risk of contamination when there is direct contact with food (see 3.5.3).

Control

First of all, washing the hands *properly* is vital. For a description refer to paragraph 2.6. If jewellery forms a risk of cross-contamination, it should be removed before the hands are washed. Any tools used should be cleaned regularly, depending on the frequency of use (about once a week to once a day; also see T2-1.10 toilet).

Towels are very important and should be clean, especially because they are used after the hands are cleaned. In order to prevent contamination of or by the towel it should only be used for clean (properly washed) hands. Therefore, it should not be used to wipe off dirty fingers or the mouth. As towels absorb very well, they provide an excellent environment for micro-organisms to survive. By hanging out the towel such that it can dry, the chance of micro-organisms surviving and therefore the risk of cross-contamination reduces. The towel should be changed regularly (depending on frequency of use, i.e. once or twice a week to once a day).

4.3.2 Risks and control: 2nd priority

If the hands are very dirty (grease or soil) preferably do not use a nail brush. This rigorous approach might easily damage the skin, which can cause irritation. Any small wounds that may occur can be a host to pathogenic micro-organisms. Wash the hands instead with a greasy product (grease will absorb the dirt so that it can be rinsed off) or with special hand cleaning product. Wash the hands afterwards with hot water.

Use cotton wool and tissues (for other hand and skin care) only once. If they are kept for re-use the micro-organisms, which may grow in the meantime, will be (re-) introduced to the skin later.

4.4 Skin care

4.4.1 Skin diseases

By skin diseases are meant: scabies, eczema, and spots.

4.4.1.1 Risks: 1st priority

Although skin diseases (such as eczema) are not necessarily contagious they often involve high numbers of micro-organisms. Too rare or improper hygienic measures can cause these micro-organisms to be transmitted to the own skin, hands (and the like), to others or the environment. Contamination of one's own skin could cause the skin disease to spread.

Control

Ensure professional treatment of skin diseases. Wash the hands before and after treating skin. When suffering from spots use a special cleaning agent or disinfecting tonic.

4.4.1.2 Other risks and control

2nd priority

People suffering from skin diseases may be extra susceptible to new incidences of contamination. Any foreign or skin proper micro-organisms entering (small) wounds may lead to infection.

Wash the skin and hands carefully both before and after treatment.

3rd priority

If a skin disease is diagnosed it is advisable to follow its development carefully. If it is a long-term disease a doctor should be consulted. It is possible (but not very likely) that an apparent skin disease (such as eczema) is in fact a scabies contamination.

4.4.2 Ear and other piercing, and tattoos

4.4.2.1 Risks: 1st priority

Ear piercing and other types of piercing (both new and existing ones), and new tattoos can cause bleeding, fluid and/or pus to leak from the wound. This contaminated body fluid can infect other people, the surroundings, or food through the hands.

If these areas are not properly cleaned, dirt will accumulate inside the piercing, and after some time an infection will occur. Piercing in moist places such as the tongue, lip, nose, or genitals cause a much higher risk of infection.

Control

With ear piercing and other types of piercing hygiene is essential. Piercing in risky (moist) places of the body need extra hygienic practice. This means regular washing and disinfecting if necessary. Always use clean and dry tools (tissues, towels, etc.)

4.4.3 Jewellery

4.4.3.1 Risks and control: 3rd priority

Skin covered by jewellery is always more contaminated than the rest of the skin. Some (open-work) jewellery accumulates dirt (micro-organisms). In general, this does not pose any risk. There is, however a risk of (cross-) contamination when, for instance, changing a baby, touching food (see 3.5.3), or when the surrounding skin is broken. In these cases it is advisable to take off the jewellery and clean the skin.

4.4.4 Shaving and depilating

4.4.4.1 Risks and control: 3rd priority

Shaving (wet or dry) and depilating cause little wounds in the skin which may be infected by skin proper flora (staphylococci). This can cause infection and inflammation. When shaving takes place regularly, the skin

becomes more resistant. After shaving the skin should be dried properly and treated with a skin care product if necessary.

The use of a shaving gel or foam for wet shaving can cause irritation. Try another product or shave dry.

Shaving or depilating tools should be cleaned (rinse well), and dried after use. Shaving brushes in particular should be left to dry properly. Furthermore, it is not recommended that these tools be used by more than one person. If they are, cleaning them is absolutely vital.

4.4.5 UV light

4.4.5.1 *Risks and control: 3rd priority*

Contact surfaces on sunbeds should be cleaned after use to prevent cross-contamination.

The use of sunbeds or other types of solarising lights can cause direct damage (sunburn) or permanent damage (skin cancer). As this is not directly connected with hygiene, this is not covered in this document. Burned skin does entail a greater risk of infection (see 1.2).

4.5 **Hair care**

4.5.1 Washing

4.5.1.1 *Risks and control: 3rd priority*

Washing one's hair is a cleaning activity, which is merely aimed at personal well-being. After washing the shampoo should be properly rinsed from the hair to prevent residues from causing irritation.

In the case of a disease of the scalp (such as dandruff) the use of a special shampoo is recommended.

4.5.2 Styling and combing

4.5.2.1 *Risks and control: 3rd priority*

If combs, brushes, and hair styling tools such as pins, bands, and ribbons are shared, there is a risk of transmission of micro-organisms, and head lice. Information on the prevention and treatment of head lice can be obtained from the "GGD" [Regional Health Service].

If certain tools are used day after day, they may accumulate micro-organisms. Touching them will cause bacteria to transmit to the hands and surroundings. Regular cleaning of these tools is recommended.

4.5.3 Cutting

4.5.3.1 *Risks and control: 3rd priority*

Cutting the hair should be done carefully to prevent injuries.

4.6 **Ear care**

4.6.1 Earwax

4.6.1.1 *Risks and control: 2nd priority*

The ear constantly produces earwax, in quantities that varies from person to person. If it is not removed in the correct manner, the ear may get clogged. Removing too much earwax can even cause irritation and inflammation. Pushing in part of the earwax while trying to remove it causes problems too, and so does removing earwax with used (and therefore contaminated) cotton buds. It is recommended not to clean the auditory duct *at all*, but to merely clean the auricle. If a hearing is impaired, consult a doctor.

4.6.2 Hearing aids

4.6.2.1 *Risks and control: 3rd priority*

Hearing aids and earphones of a Walkman for instance should be regularly cleaned (weekly) if used frequently.

Shared use of these materials can cause cross-contamination.

4.7 Eye care

Eyes have a natural protection against micro-organisms. If, however, the outer eye membrane is damaged, micro-organisms can cause an infection.

4.7.1 General

Avoiding damage of the outer eye membrane can prevent eye infections. This should be noticed in the following situations:

- When applying eye make-up (this should be done very carefully)
- When doing technical (DIY) jobs (wear protective glasses if necessary)
- When inserting and wearing contact lenses.

4.7.2 Contact lenses

4.7.2.1 Risks: 1st priority

Wearing contact lenses increases the risk of eye irritation or infection as lenses can bring surrounding micro-organisms to the eye.

The contamination preceding the infection has various routes. A major transmission route is air. If coughing and sneezing is done without covering the mouth with the hand, micro-organisms are transmitted. Contamination can also be caused by micro-organisms on the hands coming from eyes or surrounding areas. Contact lenses can be contaminated by the hands or by their container; this can likewise transfer micro-organisms.

Control

Airborne transmission of pathogens and the prevention thereof is treated in paragraph 4.13.1.

In order to prevent contact lenses from contamination by the hands, wash them with soap before inserting the lenses. The container fluid should also be rinsed off. To do this, use a rinsing liquid or cold running water. Preferably use rinsing liquid in small packaging units. Read the instructions well and do not use the liquid past the expiry date. It is not advisable to wet contact lenses by taking them in the mouth, because the mouth is full of micro-organisms that could cause irritation or infection of the eyes. Do not use sucking devices as well, as they always contain micro-organisms.

It is recommended to clean lenses immediately after use. Carefully wash the hands before doing so. To clean the lenses use a special cleaning agent with protein remover. Carefully follow the instructions on the label. After cleaning, store the lenses in their container adding some disinfecting container liquid. Clean the container in the washing-up weekly. It is recommended to replace the container regularly. Replace it immediately when detecting damage or scratches inside the compartments.

The use of permanent wear soft lenses is not advisable due to the much bigger risk of irritation or infection.

It is also not advisable to clean the eyes using an eye-bath, because cross-contamination by the skin and hairs around the eye to the eye itself is most likely. If an eye-bath is used, be sure to boil it after use.

4.7.2.2 Risks and control: 2nd priority

Refresh the container liquid inside the container daily. If re-used, the disinfectant will 'get exhausted' and micro-organisms can reproduce after all.

Do not wear contact lenses too long. They get too heavily polluted and cause lack of oxygen. The eyes will get irritated which is *not* cured with eye drops. Ultimately the irritation can cause an infection. Take out the lenses and clean them.

When inserting eye drops into the eye, take care not to contaminate the dropper. Avoid touching the dropper with the hands, face, or surroundings. Carefully read the instructions and take notice of the expiry date. Eye drops have a short shelf life.

4.7.3 Face

4.7.3.1 Risks and control: 2nd priority

Do not rub the eyes with the hands. Bacteria which are not harmful to the facial skin, can cause irritation or infection of the eye.

Use a clean handkerchief to remove dirt from the eyes. The contamination caused by a dirty handkerchief is probably bigger than that caused by the hands.

3rd priority

When washing the face it is best when the facecloth and soap are not contaminated as this could cause contamination of the eyes.

4.8 Dental care

4.8.1 Brushing the teeth

Caries is the development of cavities in teeth and molars due to the breakdown of dental enamel by organic acid. Specific bacteria from consumed food produce these organic acids.

4.8.1.1 Caries: 1st priority

Brushing the teeth not often enough or too short is a major cause of caries. An additional risk factor is caused by the use of dental braces, because food remains are so easily accumulated. Apart from these hygienic aspects, there are also eating habits (type of food and eating frequency) which greatly influence the existence of caries. This, however, is not covered in this code.

Control

The basis for a good oral hygiene is brushing the teeth properly twice a day. Properly brushing ones teeth is considered to take at least two minutes. Use a soft or moderately hard toothbrush and brush gently to prevent damage and infection of the gums. Besides, brushing too vigorously causes the dental enamel to wear more quickly. Improper brushing of the teeth is not the only cause of caries. Detailed information on preventing caries can be obtained from the Ivory Cross or your dentist.

4.8.1.2 Infants

If a person who takes care of an infant licks the rubber teat of the infant's bottle, caries causing bacteria can be transferred to the infant. Although sooner or later this is bound to happen anyway, proper oral hygiene (as described in the above) of the caretaker can reduce the risk of transmission. Another important factor is not to keep on feeding an infant using a teat for too long. This may even affect the second teeth. More information on this can be obtained from the child care centre.

4.8.1.3 Other risks and control

2nd priority

A toothbrush may be contaminated by a contaminated cup or toothbrush holder, by inadequate rinsing after use, shared use, or by not being allowed to dry after use. Although the risk of this happening is not great, it can cause the transmission of diseases.

The use of an incorrect type of toothbrush causes inadequate cleaning of the teeth and risk of damage of the gums.

Use a soft or medium toothbrush with a short head. Replace it every two months. Rinse it well after use and store it such that it can dry. Wash up the cup and toothbrush holder regularly. Be sure that everyone has an own toothbrush.

3rd priority

If, when rinsing one's mouth, water is taken directly from the tap, bacteria from the mouth may infect the tap. There is a hazard, although minimal, that the user coming next is contaminated. Therefore, the use of a cup is recommended.

4.8.2 Tooth floss, sticks, and mouth spray

4.8.2.1 *Risks and control: 2nd priority*

Tooth floss, tooth sticks, or mouth spray can be used to remove food remains from in between the teeth. Re-use of these instruments causes contamination. Especially when damaged, gums can become infected.

Use tooth floss and sticks only once and fill the mouth spray with clean water. When using these instruments, be careful not to damage the gums. Empty, clean, and dry the mouth spray after use.

4.8.3 Dentures

4.8.3.1 *Risks and control: 2nd priority*

Before storing a dental plate, it should be cleaned first. Then store it in clean water and ensure that the container is cleaned regularly. If not, micro-organisms can blossom. By placing the dentures back into the mouth (too) large numbers of micro-organisms are swallowed. Ask the dentist for advice on this.

4.8.4 Braces

4.8.4.1 *Risks and control: 2nd priority*

Braces easily accumulate food remains. Therefore, it is recommended that braces be cleaned with a toothbrush immediately after taking them out. Then store the braces such that they can dry. Ask the orthodontist for advice.

4.9 Foot care

4.9.1 Cutting the nails

4.9.1.1 *Risks and control: 2nd priority*

Nails are always slightly contaminated. When the skin is broken during cutting, an infection may occur. Always be careful when cutting nails.

3rd priority

In order to prevent dirt from accumulating under nails, they should be kept short. Use clean tools and clean them after use.

4.9.2 Washing

4.9.2.1 *Risks and control: 2nd priority*

Similar to the shower cabin floor, a foot bath or foot Jacuzzi can serve as a transmission route for athlete's foot. Prevent this by using clean water and by cleaning and drying the bath and shower cabin floor after use.

If athlete's foot is diagnosed specific hygiene measures are required. Thorough and regular cleaning of both feet and foot bath, shower or bath tub floor and socks, combined with proper drying (if necessary use a hair dryer to dry in between the toes) is often sufficient to solve the problems. Special cleaning products for athlete's foot are available. If necessary, consult a doctor to diagnose athlete's foot. In the case of medical grounds (when there is question of a serious protracted case of athlete's foot) a combined treatment involving disinfection of the shower cabin floor, thermal disinfection of the socks, and treatment of the feet is recommended. Paragraph 1.5 contains more details on the conditions required to apply disinfection.

3rd priority

Use clean tools and wash or change them after use. Ensure that the feet are dried properly after washing, especially in between the toes.

4.9.3 Shoes

4.9.3.1 *Risks and control: 2nd priority*

If the shoes provide inadequate ventilation for the feet, perspiration on the feet cannot escape. This can evoke skin fungi to grow, which may cause small injuries. (Skin) bacteria which may cause the wounds to infect easily

contaminate these injuries. Ensure therefore that you are wearing shoes which provide adequate ventilation for the feet (so, do not wear closed plastic shoes). Do not put shoes on while the feet are still wet, and if you are susceptible to athlete's foot, dry the feet with a hairdryer.

If you are not wearing any shoes, there is a risk of injuring the feet. Skin proper bacterial flora (for example *Staphylococcus aureus*) can infect injuries in the soles the feet. It is advised not to walk barefooted unless absolutely safe.

4.9.4 Pedicure

4.9.4.1 Risks and control: 3rd priority

Use the materials, tools, and personal care products in compliance with their instructions. This prevents injuries and contamination (and possibly infection as well). Clean the materials and tools after use.

4.9.5 Foot-muff

4.9.5.1 Risks and control: 3rd priority

When using a foot-muff be sure the feet are clean and dry. This prevents cross-contamination and bacterial and fungal growth.

4.10 Baby care

This paragraph deals with the various activities performed in the presence of a baby. Especially during the first 6 months of a baby's life, hygiene is crucial because the baby's own resistance is not yet sufficient.

4.10.1 Playing

4.10.1.1 Risks: 1st priority

A baby's dummy is used a lot (in the mouth, spit out, kicked about, and picked up), and can thus be a source of contamination. Remains of food, posset, dust from the floor, and possibly faecal contamination could be present on the dummy and swallowed by the infant.

Toys are also kicked about and put in the mouth. Children can so be contaminated by their surroundings or one child can contaminate another - via toys - (for instance with viruses).

Control

In order to reduce cross-contamination dummies and toys should be cleaned regularly. When buying new toys this aspect should be taken into account. Preferably buy cuddly toys that are washable at 60 °C (with regard to house dust mites).

4.10.1.2 Risks and control: 3rd priority

Frequent contact between a baby and other individuals does only create risks (of cross-contamination) if the other individuals are ill.

4.10.2 Changing

4.10.2.1 Risks

From the point of hygiene, changing a baby involves a number of microbial risks because there is a direct contact with faeces. As the intestinal flora is just starting to develop unwanted bacteria may occur. There is, therefore, a substantial risk that the carer contaminates him- or herself, the baby, or the environment with faecal bacteria while changing a baby. If the baby's buttocks are not cleaned before putting on a new nappy it is likely to cause irritation of the skin.

Cotton nappies absorb badly. This increases the risk of contamination of the surroundings while changing the baby. As cotton nappies are usually saved up to be washed later, there is also an increased risk of cross-contamination. This also applies when the nappies are washed at home.

Control: 1st priority

In order to prevent cross-contamination as much as possible, only touch those surfaces, tools, and body parts that are necessary to change the nappy. Do not touch the face while changing a nappy. Change the cover or towel on the commode at least every other day, and in the case of visible soiling. Use baby wipes only once, and change the wash cloths daily.

Due to the high risk of cross-contamination, it is recommended not to use cotton nappies. If you do, extra attention to hygiene (to prevent cross-contamination in particular) and cleaning practice is required. You can also use a 'nappy service' whereby the nappies are regularly collected from your home and washed externally.

4.10.2.2 Cleaning

Changing a baby involves cleaning its buttocks as well. It is recommended to use baby wipes, tissues and/or a wash cloth. Throw away baby wipes and tissues after use. After using a wash cloth, rinse and dry properly. Change wash cloths at least once a day, but preferably use them only once (put them in the wash after use). Before putting on a clean nappy, make sure the baby's skin is properly dry.

After changing a baby, wipe off any dirt from the hands using a baby wipe. Always wash the hands afterwards. Also clean any tools and contaminated surfaces using a (special) cleaning product. If there has been direct contact between the baby and any contaminated surface (for instance with its hands), clean the (contaminated) body parts of the baby as well. After cleaning, the baby, the hands of the carer, and the tools and surface should be dried properly.

4.10.2.3 Risks and control: 2nd priority

If nappies absorb inadequately (for instance cotton nappies), or if they are worn too long the baby may develop nappy rash. Nappy rash is caused when the skin is exposed to moisture for too long and becomes swollen, allowing faecal enzymes to become active. The skin will react to this, turn red and can get infected. This can be prevented by checking that the nappy absorbs well, fits well, and is changed regularly (or a combination thereof). Particularly during the summer nappies should be changed more often, because the high temperatures cause the nappy to become 'sweaty'. If a baby has nappy rash, it should be changed even more frequently, and zinc oil or a barrier cream should be applied.

3rd priority

Put used (and therefore contaminated) wash cloths and cleaning wipes in an appropriate place. This reduces the risk of cross-contamination. Clean this place daily.

Use clean tools (for instance a tea towel), and cloths to prevent contamination by similar materials.

Long-term use of anti-bacterial cream can lead to the selection of resistant micro-organisms. This may hamper treatment of a possible infection. Therefore it is recommended not to use anti-bacterial ointment.

If a baby's skin is inadequately dried or stays moist because of damp clothes, it will start to get chafed. Chafed skin is more susceptible to contamination and infection. Therefore a baby's skin and its clothes should always be dry.

Baby care products: 3rd priority

The incorrect use of baby care products can cause irritation of the skin. Examples are the use of too much soap or shampoo, or insufficient rinsing off of soap or shampoo. Do not use personal care products for adults on babies. Read the instructions first.

4.10.3 Feeding

4.10.3.1 Risk: 1st priority

Stuck-on food remains of the previous feed (meal) may contaminate bottles, teats, de trainer cup, plates, or spoons used to feed the baby. Bacteria can reproduce in these food remains and then infect the baby. As the hydrochloric acid production in babies is underdeveloped, the risk of infection caused by contamination is great.

Control

In general, after the first six months a baby will have sufficient resistance and the hydrochloric acid production will suffice. Until then, feeding tools (bottle and teat) should be thermally disinfected daily (boiling with water or steam).

The radiation of the microwave does not have disinfecting properties. The microwave can be used for disinfection by placing the tools in water and boiling it. More detailed information on this subject can be obtained from the baby care centre.

4.10.3.2 Risks and control: 3rd priority

Use clean bibs, and hydrophyl posset squares. Implements which were used and which have been spilled on are contaminated. The micro-organisms present can be transmitted to the baby.

When breast feeding the frequent sucking (the mechanical action) and the moist surroundings can cause irritation of the nipple and cracks. This can cause contamination and infection. Preventive measures are regular washing and proper drying of the nipples and breasts, regular renewal of breast pads so as to keep them dry, and the use of nipple cream, if necessary.

4.10.4 Sleeping

4.10.4.1 Risks and control: 2nd priority

The mattress and sheets become damp by sweat, posset, excrement, and urine. This damp environment can become a host to fungi and mites so that the baby can become exposed to allergens. Therefore it is advisable to protect the mattress with a plastic protective sheet. Change the sheets regularly and in any case after 'little accidents'.

3rd priority

High atmospheric humidity in the bedroom leads to the development of fungi (amongst other places in the mattress), and to growth of the storage mite. This can cause allergic reactions.

It is not recommended to keep too many plants in a small, closed bedroom. Ensure that the bedroom is aired and heated to at least 18 °C in winter, so that the air will not become too damp (Also see 5.3.1.1).

4.10.5 Washing

4.10.5.1 Risks and control: 2nd priority

Wash water or bath water should not be used for more than one child so as to prevent the possible transmission of pathogenic micro-organisms. Ensure that the bath and the bath toys are cleaned regularly and then dried so as to prevent contamination by those as well.

4.11 Sexual hygiene

4.11.1 Risks and control: 2nd priority

Hygiene before, after and while having sexual intercourse is essential with a view to sexually transmitted diseases (STDs), but also in relation to the possible contamination with excrement. Contamination of the vagina with faecal matter can cause cystitis. In order to prevent this, personal hygiene prior to sexual intercourse is required. During intercourse care is required that faecally contaminated matter be kept away from the vagina.

To prevent STDs the use of condoms is recommended. More information on STDs and the prevention thereof can be obtained from the 'SOA-stichting' [STD Foundation].

4.12 Personal care products

4.12.1 Risks and control: 3^e priority

Personal care products are free of microbial risks on purchase. They are also resistant to the microbial contamination that is able to occur in normal use. If a user, however, touches the product with wet or contaminated hands, when his/her hands are injured or when he/she is suffering from a skin disease, the product can become contaminated. This contamination could be transmitted when the product is used later.

To use hand and skin care products properly, they should be applied and kept in compliance with the instructions. It is recommended not to buy liquid products (cleaning solutions for lenses, and mouth water) in economy-size packaging. When applying creams or ointments, be sure the hands are clean.

4.13 Illness

4.13.1 Coughing, sneezing, and blowing the nose

4.13.1.1 Risks: 1st priority

By coughing and sneezing micro-organisms and viruses disperse in the air. If the mouth is not covered by the hand, the effect can still be noticed at a distance of seven meters. This dispersion can cause other people to become contaminated and even contract an infection.

If, on the other hand, the mouth is covered when coughing or sneezing, there is a risk of cross-contamination through the contaminated hands. Someone else can obtain the pathogen through contact with a surface or the person in question. To a greater extent, this applies to the re-use of handkerchiefs. Micro-organisms are perfectly capable of surviving in warm (pockets) and a moist environment. If a used handkerchief is used again, the risk of contaminating the hands is substantial.

Control

Cross-contamination can be prevented by *always* covering the mouth when coughing or sneezing (the so-called coughing discipline). If possible, use a paper handkerchief and throw it away after use. If a paper handkerchief is not available, it is recommended that the hand be washed afterwards. When blowing the nose, use a paper handkerchief as well.

These measures are absolutely vital during food preparation.

4.13.2 Injuries

4.13.2.1 Risks and control: 2nd priority

In order to prevent infection of a small open wound, the wound should be cleaned carefully. Furthermore, it should be prevented that a wound stays wet. Preferably let a wound air-dry. If a wound does not dry quickly, the use of medicinal ointments (zinc oil) and absorbent dressings (do not stick to the wound) can be considered. Renew the Band-Aid or dressing regularly, in any event when saturated with fluid from the wound or blood. This way the wound cannot be infected by contamination of the dressing.

During food preparation injuries should be properly dressed and not leak any fluid or blood, as these are contaminated with microbes. Contact with food can (after sufficient time and temperature) cause food infection.

3rd priority

Open wounds can cause contamination of the surroundings by fluids or blood. When looking after open wounds, be sure to keep away from food and to clean (any) contaminated surface and the hands afterwards.

4.13.3 Nursing

4.13.3.1 Risks: 1st priority

If one or more family members are ill and being nursed in the home, there is a risk of transmission of the disease. For instance the flu, diarrhoea, vomiting, a cold, (?water) warts, or a fungal infection.

Control

In order to prevent the transmission of pathogens extra attention should be paid to the potential sources of contamination: firstly the patient himself, but also the toilet, cloths, sheets, and hands. Cross-contamination is prevented by washing the hands and by cleaning materials and areas more frequently, where necessary using a special product.

4.13.3.2 *Taking the temperature: 3rd priority*

If, during illness, the person's temperature is taken with a (mercury) thermometer it should be cleaned afterwards (a thermometer is not to be cleaned with hot water). After cleaning, the thermometer should be dried properly and stored in a clean and dry place.

If the same thermometer is used for several patients, or if the temperature is taken rectal, the thermometer should be cleaned with (70 %) alcohol after use. Let the alcohol air-dry. As an alternative to the mercury thermometer an ear thermometer can be used. This involves much less microbiological risks.

Wash the hands after cleaning the thermometer.

4.13.4 New mothers

4.13.4.1 *Risks and control*

2nd priority

The post-partum discharge in new mothers causes a tear suffered during childbirth to become moist. This increases the risk of wound infection by skin proper bacteria. It is therefore vital that the wound be kept as clean and dry as possible. As this area is moist by nature, keeping it dry is not an easy task. Advice can be obtained from the obstetrician or physician (rinse). Furthermore, it is essential that (maternity) sanitary towels be changed regularly (see 4.14.3).

3rd priority

If a new mother suffers a tear during childbirth and the wound is infected (see 4.13.4.1); this may cause internal infection as well. In this case the obstetrician or physician should be consulted.

4.14 Visiting the toilet

4.14.1 General

4.14.1.1 *Risks: 1st priority*

The toilet is a place with a high risk of cross-contamination as this is where the excrement of the body is discharged. Contact between a person and his excreta is inevitable. In particular, faeces are very contaminated and likely to contain pathogens. Contamination of the hands is to be expected and thus also of all surfaces in the toilet, such as the light switch, the flushing lever, the toilet brush, the tap, toilet roll (holder), and the hand towel. As different people use the toilet and they all touch the same surfaces, it is likely that the toilet transmits micro-organisms (for example the hepatitis A virus). By hand-mouth contact these micro-organisms are subsequently ingested.

The toilet is a major transmission route for various diseases as the risk of cross-contamination is high. However, not all micro-organisms by which one can be contaminated are pathogenic. A pathogenic contamination does not by definition jeopardise the health: healthy skin keeps the pathogen at bay. After a visit to the toilet the skin (the hands) should be washed, though (see 4.14.1.2), to prevent the pathogenic contamination to take place by hand-mouth contact. Moreover, contaminated hands can also infect the house environment. In this way, contaminated surfaces can serve as transmission medium. The situation becomes risky if, after a visit to the toilet, food is touched. With the right amount of time and at the right temperature, the contamination in the food can grow to infectious numbers.

Depending on the type of toilet bowl flushing causes an aerosol. This dispersion contains liquid spray particles carrying micro-organisms. It can get in contact with the skin and be inhaled.

Control

In order to prevent transmission of toilet contracted contamination of the hands to one's own mouth, the interior of the house, other family members, or food washing the hands is essential. The washbasin should preferably be situated *inside* the toilet area. After washing the hands, dry them with a dry hand towel. For more detailed information, refer to paragraph 2.6.

The hand towel should be clean to prevent contamination of the clean hands. Change the towel regularly (about once or twice a week to once a day). Also see 4.3.1. Alternatively use disposable paper handkerchiefs (not yet available to the domestic household).

Closing the toilet lid before flushing can prevent aerosol contamination caused by flushing the toilet.

Cleaning

It is recommended that toilets be cleaned regularly. At least once a week the toilet should be cleaned with water and soap, toilet brush, and cloth (put the cloth in the wash afterwards). During each cleaning notice the order of handling: first the contact surfaces, then the toilet seat, then the toilet bowl (not with the cloth, but with the toilet brush), and last the walls and floor. Alternatively clean the toilet bowl with a special cleaning product with increased self-activation. Use this product in compliance with the instructions.

Regular cleaning of the toilet is not an alternative to washing the hands (see 4.14.1.1).
If visible dirt or fluids are spotted on the toilet, clean these immediately.

Illness

If one of the toilet users suffers from diarrhoea (or uses the toilet to vomit in), the toilet contaminates quicker and the risk of cross-contamination increases. As contamination is (probably) observed sooner, cleaning will have to be take place more often. The hand towel should be changed at least once a day. Use disposable paper towels or a separate towel for the patient if possible.

If a family member has a contagious disease, this may (depending on the nature of the disease) be a cause to disinfect. Consult an expert in this field if necessary (Also see 1.5).

4.14.2 Using the toilet

4.14.2.1 *Risks and control*

2nd priority

The use of moist toilet paper is not recommended. The relatively high concentration of preservatives may cause irritation.

Women and girls are advised to be careful when wiping themselves after passing motion: wipe from front to back and not the other way round. Faecal contamination of the vagina can cause a bladder infection.

3rd priority

Apart from contact surfaces (see 4.14.1.1) other parts of the toilet area can become contaminated as well, for instance by urinating standing upright, or using the toilet brush. The exterior of the toilet bowl, the floor, the waste bucket, the potty, the toilet roll holder, etc. can also become contaminated. Therefore, decent use of the toilet is good hygiene practice. For male users this means that they should urinate sitting down.

Objects like carpets, pedestal mats, rough wall covering, corners, edges, holes, and absorbing surfaces are difficult to clean and should be avoided in toilet areas as much as possible.

4.14.3 Menstruation and incontinence

4.14.3.1 *Risks and control: 2nd priority*

If the vagina or vaginal area is irritated or injured, incorrect use of tampons, sanitary towels or incontinence towels can cause the complaints to exacerbate. The micro-organisms present thrive in moist and warm conditions. In the past, incorrect use of certain tampons has caused the 'Toxic Shock Syndrome' (TSS). TSS is caused by *Staphylococcus aureus* and is a serious and potentially fatal disorder which fortunately occurs very rarely. When using tampons, sanitary towels, or incontinence towels one should notice the following aspects to prevent infections and other symptoms:

- Read the instructions and act accordingly
- Wash the hands prior to applying a tampon. Ensure that the vagina and the vaginal area are clean
- Use one tampon at a time
- Do not use a tampon with a higher absorption rate than the one corresponding to the (degree of) menstrual blood
- Change sanitary towels or tampons regularly (after 4 to 8 hours). Do not forget to remove the last tampon at the end of the menstrual period.
- Use both tampons and sanitary towels alternately
- Do not use tampons outside the menstrual period

- Wear clean underwear.

When changing tampons or sanitary towels the toilet area can get contaminated. Therefore, contact with the surrounding area should be avoided until the hands are washed. Use a clean towel to dry the hands.

3rd priority

Ensure regular removal of waste. If kept too long (especially at high temperatures) microbial growth will occur. This increases the risk of cross-contamination while removing the waste.

4.15 Using the bathroom

4.15.1 Risks and control

The atmospheric humidity in the bathroom increases after a shower or a bath. If condensation stays behind on the walls or floor, fungi are allowed to reproduce. This can inconvenience people suffering from allergies.

Fungi on the feet can be transmitted from one person to the other through the shower cabin floor or bath. This is a way to contract athlete's foot.

Bath towels do also get contaminated and are capable of transferring micro-organisms to others, especially when the same towel is used to dry the upper and lower body parts. If a towel is not line dried after use, it will remain damp allowing micro-organisms to survive and even develop.

Control: 1st priority

In order to reduce fungal growth, the atmospheric humidity in the bathroom should be kept low. Therefore it is recommended to dry and ventilate the bathroom after taking a shower or a bath. For more detailed information on humidity and ventilation, refer to 5.3.1.1.

Use different towels (and facecloths) for the upper and lower body. Use them once (put them in the wash) if this distinction is not made. Ensure that towels and face cloths are hung up to dry after use. Change them regularly.

Cleaning

If there is mould on the walls (particularly in the joints), one should dry and ventilate the bathroom better. To remove the mould, treat the walls with an appropriate cleaning agent. The most efficient products are those containing active oxygen or active bleach.

If a household member suffers from athlete's foot, it is recommended that the shower cabin floor and bath be cleaned (using a special cleaning agent) and dried after use. Disinfection is not a routine treatment. On medical grounds one could disinfect the floor as well. Follow the instructions. (Also see 1.5 and 4.9.2).

4.15.2 Risks and control

2nd priority

In the damp environment of the bathroom, fungi and bacteria thrive in those parts that are difficult to clean or easily contaminated, like the plug hole, shower head, shower curtain, anti-skid mat, pedestal mat, or rough wall structure. The micro-organisms in these places can be transmitted while using the bathroom. Regular cleaning and drying of the bathroom and the objects listed previously is therefore recommended. For more information on humidity control refer to paragraph 4.15.2 and 5.3.1.1.

Warm water which stays behind in the pipes, can cause limited growth of pathogens. In particular the *Legionella* can be relevant here. If ingested, the *Legionella* is harmless, but if inhaled it could cause disease. Airborne infection is possible when the *Legionella* bacteria is present in dispersed water, such as during a shower. For more information refer to paragraphs 5.2.2.3 and 5.7.1.3. It is recommended to flush out the warm water pipes through the tap until the water has reached the highest possible temperature before turning on the shower again.

3rd priority

Ensure that the cleaning tools are dried properly after use, in particular the sponge, face cloth, and towel. If not, the micro-organisms with which they are contaminated will be allowed to develop.

If several people share bath water and tools, cross-contamination can occur.

After bathing, showering, or washing the skin should be dried properly. If it stays moist, for example in between folds of the skin, this can cause irritation (chafed skin). This risk is particularly high with the elderly and the young. Chafed skin is susceptible to contamination and infection.

4.16 Using saunas and swimming pools

4.16.1 Risks and control

4.16.1.1 2nd priority

Similar to the shower base, the floor of private swimming pools and sauna can also cause transmission of athlete's foot and warts. Regular cleaning and drying of the floor helps to prevent cross-contamination (see 1.5 and 4.9.2).

If swimming pool maintenance does not take the measures required to reduce survival and reproduction of micro-organisms, there is a risk of (amongst others) ear infection. Maintenance and cleaning guidelines have been drawn up in the 'Wet hygiëne and veiligheid zwemwater' [Hygiene and Safety of Swim Water Act].

3rd priority

Home saunas are heated through dry leakage air. Moisture is added by means of steam. Due to its high temperature there is no risk of *Legionella*.

The moist atmosphere in the sauna can cause microbial contamination (for instance those carried inside by the users) to develop and (re) contaminate its users. Therefore, the sauna (and accessories) should be cleaned regularly.

4.17 Using textile

4.17.1 Purchasing

4.17.1.1 Risks and control: 3rd priority

Depending on the purpose of the textile to be purchased, any washing instructions should be noticed beforehand. Woollen or silk textile, and down-filled quilts or pillows are not resistant to thermal disinfection (temperatures higher than 60 °C) or dry-cleaning. Therefore, it is not recommended to buy sheets, underwear, socks, or baby's cloths made of wool, silk, or down, because these articles should be thermally disinfected. Read the washing instructions on the label before purchasing textile.

4.17.2 Wearing

4.17.2.1 Risks and control: 3rd priority

By wearing contaminated clothes, or underwear, and by using towels and sheets, etc. micro-organisms can be transferred. Therefore, change textile regularly.

Clothes can also serve as a transmission route for lice. More information on this subject can be obtained from the "GGD".

4.17.3 Storing dirty laundry

4.17.3.1 Risks and control: 3rd priority

If dirty laundry is stored under moist conditions or moist textile (e.g. a used towel) is stored with dirty laundry, microbial growth will occur. Fungal growth can cause stains (weather-stains) and allergic reactions.

4.17.4 Washing

4.17.4.1 Risk: 1st priority

In the case of illness or allergy in the house, the washing of textile is vital to eliminate and/or remove pathogens and house dust mites. If, however, washing is performed incorrectly, the pathogens or mites may survive the wash.

Control

In order to prevent the transmission of pathogens in the case of an illness, the towels, facecloths, sheets, pyjamas, teddy bears, and underwear should be washed at 60 °C using an all-in-one detergent (a powder detergent containing bleach, so no delicate wash detergent, colour or liquid detergent). Read the instructions for use on the label.

In order to prevent an allergic reaction to house dust mite, sheets should be washed regularly (weekly) at 60 °C using an all-in-one detergent.

4.17.4.2 Risks and control: 2nd priority

By hand-washing the skin can become irritated and dry through the combined impact of water, detergent and the mechanical handling. With sensitive hands, use can be made of rubber household gloves or the washing machine. When using the washing machine, follow the dosage instructions of the detergent.

4.17.5 Drying clean washing

4.17.5.1 Risks and control: 3rd priority

Prior to putting away the textile, it should be thoroughly dry. Ensure that the storing place is dry as well. If not, fungi can grow (allergic reactions), and the textile becomes susceptible to vermin.

5 Indoor environment, pets and pests

5.1 Action points

This paragraph lists the control measures or action points for all operations involving the indoor environment, pets, and pests based on the hazard analysis, and risk estimate with a high priority.

Ventilate and heat the house

- Heat the house during winter and avoid large temperature variations;
- Ventilate the house throughout the year via grates or cantilever windows;
- Ensure extra ventilation during and after activities releasing extra moisture (cooking, laundry drying, and showering), if there are pets in the house, or when using combustion equipment;
- Ensure annual maintenance of any mechanical ventilation system, and combustion equipment (gas heater, or boiler);
- Smoke as little as possible inside the house. If there is cigarette smoke inside the house, ventilation and airing is even more important.

Prevent (cross-) contamination

- To keep pests at bay, act as follows:
- Ensure proper packaging of food products
- Clear away waste, spilled food fluids immediately
- Place screens
- Consult a professional pest control service in the event of pests in the house
- Dispose small amounts of waste in sealed bags (moist organic waste should be wrapped in newspaper)
- Place the organic waste container outside; if this is not possible, do not separate organic waste from normal household waste.

Wash the hands frequently and properly

- Wash the hands after touching a pet, or in any event if food is prepared or eaten subsequently.

Pay extra attention to hygiene with pets

- Dogs and cats should be wormed twice a year
- Pets need regular care: kennels, baskets, and cages should be cleaned preferably outside once a week. YOPIs are advised not to undertake this cleaning action.

Other

- Open the tap and let the water flow for a minute after a holiday or weekend out
- Set the temperature of the water boiler to at least 65 °C.

5.2 Introduction

5.2.1 General

The section on indoor environment, pets, and pests deals with the potential hazards in connection with the indoor air, heating, furniture, water facilities, waste treatment, care of domestic animals, use of the garden, and the prevention of possible vermin.

5.2.2 Hazards

5.2.2.1 General

Biological, chemical, and physical hazards are differentiated. Biological hazards cover both contamination with micro-organisms and 'uninvited guests' such as pests. Chemical hazards involve exposure to certain chemical compounds. A physical hazard means exposure to fibres (such as asbestos) or radiation (such as radon). The hazard analysis is mainly focused on the situations/activities in the home environment which can be undertaken by the consumer/occupant himself; this results in an emphasis on the biological hazards.

Some hazards in this sub-area occur frequently. The following paragraph will provide some background information on these.

5.2.2.2 *Bacteria, fungi and mites*

These indoor biological hazards can be health threatening in the following ways:

- Pathogenic bacteria and fungi can cause an infection in human beings
- Indoor bacterial and fungal growth (not only the pathogenic ones) often cause the release of endo- and exotoxins. There is no clear view on the exact health effects but exposure to endotoxins for example is associated with lung complaints.
- Growth and reproduction of bacteria, fungi and mite releases organic dust (cellular material) as well. Occupational exposure (farmers, pigeon fancier, flour workers, etc.) is known to cause various serious lung diseases by organic dust.
- House dust mites mainly feed on (among others human) skin flakes and/or fungi growing on skin flakes present in textile floor covering, mattresses, sheets, fabrics and such. There are also different types of storage mite in the houses. Mites produce various allergens.

People can be allergic to organic dust, fungal spores, and faeces/enzymes of mite. People who do not have allergies can develop one when highly exposed to of an allergen. This process is called sensitisation.

5.2.2.3 *Legionella pneumophila*

Legionella pneumophila is a bacterium which occurs in drinking-water, and thrives best at temperatures between 30 and 45 °C. In the gastrointestinal tract the *Legionella* does not cause health risks. Health risks do exist, however, if *Legionella* is *inhaled* through steam or spray. Particularly around showers, baths, whirlpools, and humidifiers a lot of water vapor is produced. Also the use of high-pressure spraying devices atomizes water. A *Legionella* contamination can cause two diseases: one called 'Pontiac' fever causing acute serious flu-like symptoms that are not fatal. In particular people with a reduced resistance (elderly and immune-compromised people) a *Legionella* contamination can result in the so-called Legionnaire's disease. This disease is characterised by acute pneumonia with a high fever which, if not treated adequately, will be fatal to some 10 to 20 % of the patients.

Legionella dies at 60 °C; the temperature of the water up to⁶ the draw-off taps should be at least 60 °C (at the draw-off tap the hot water can be mixed with water from the cold water pipes). If the water pipes have been unused for more than 48 hours prior to showering, one should open both the cold water and hot water tap (not the shower) for 20 seconds. When using a geyser (instantaneous water heater) it is important to notice the temperature of the water at the draw-off point as well (depending on the temperature setting and the length of the pipes between the geyser and the draw-off point).

5.2.2.4 *Zoonotic agents*

'Zoonotic agents' is a collective name for all bacteria, fungi, viruses, and parasites carried by animals (domestic animals as well) and transferable to human beings. *Toxoplasma gondii* and roundworm (*Toxocara*) also belong to this category. Particularly animal faeces are a source of zoonotic agents. If a human being is contaminated with zoonotic agents this may cause an infection: zoonosis. Contamination of humans can be caused by direct contact with animals or animal products, or by indirect contact through food contaminated with certain zoonosis.

5.2.3 Risk estimate

The risk estimate is based on the risk of exposure and the possible health consequences of that exposure (the dose-effect relationship).

Many of the hazards treated in this chapter are mainly important to people with reduced resistance, such as baby's, young children, elderly, pregnant women (YOPIs). Furthermore, the hazards are mentioned for people suffering from asthma or COPD (Chronic Obstructive Pulmonary Disease; a collection of clinical symptoms involving among others chronic bronchitis and emphysema). The bronchi of people with asthma are far more reactive to allergens and air pollution.

5.3 *Indoor air*

The house is a more or less closed off area. The composition of the air inside depends on the sources of air pollution in the house, the degree of ventilation, and the composition of the outdoor air. The temperature of indoor air affects the amount of water it contain.

⁶ Solar heaters should be provided with an additional heater which is capable of providing additional heating

5.3.1 Composition indoor air

5.3.1.1 *Moisture in the house*

Risks: 1st priority

Living in a house produces moisture. Water vapor is emitted by the respiration of people, pets, and plants, by cooking, by drying the laundry, by cleaning, showering, and washing-up. Inadequate discharge of this moisture will create dampness problems eventually. Too much moisture in the home produces a micro-climate which is favourable to fungi and mites. Damp stains and mould in the homes have been associated with an elevated incidence of respiratory symptoms. Excess moisture in the home costs relatively more energy to heat up the house to comfortable temperatures.

Control

Home dampness can be caused by characteristics of the house itself and its surroundings, and by the behaviour of its residents. In most cases, there is nothing (not much) residents can do with constructional defects or inadequate ventilation facilities of the house. The use of ventilation facilities can also be hampered due to safety reasons (e.g. burglary via tipping windows). In order to prevent problems with home dampness, one should be familiar with and use the ventilation and heating facilities of the home.

Heating

To reduce home dampness, it is essential to realise that warm air can contain more moisture than cold air. If the indoor air temperature decreases, the extra water condenses and wets the interior surfaces (carpeting, furniture). This applies particularly to cold floors, mattresses in cold bedrooms, skirting, and panelling. In order to prevent moisture in the home from condensing, the house should be heated during winter. It is recommended to keep the temperature variation limited (guideline: 5°C of variation between minimum and maximum temperature).

Adequate ventilation and heating also contribute to the prevention of increasing pests. In addition, ventilation is required for the supply of fresh air for combustion appliances and removal of any hazardous gasses and substances.

Ventilation

Apart from heating, ventilation also contributes to moisture prevention in the house. Ventilation means allowing fresh outside air to enter the house all year through.

Ventilation ensures the discharge of moisture, dust, stench, cigarette smoke, hazardous substances, etc. from the house and the intake of 'fresh' air. If cold air (low moisture content) enters the house and is heated up subsequently, it is able to contain much more water. Moisture is absorbed and the house will dry out.

In order to keep humidity at the correct level, ventilation should occur consistently and continuously. This means that the (cantilever) windows or ventilation grates should be left ajar. Depending on the wind-force the windows can be opened wide or not. Ventilation can also occur by leaving inside doors open and using the (cantilever) window and/or mechanical ventilation of that room. Adequate ventilation involves changing the air at least 2.5 times a day. The air change rate should be higher when sources of air pollution such as smoking or open fire are present.

Airing the house means opening windows and doors temporary. This is a *temporary extra* air movement which can be useful during cleaning tasks involving a lot of moisture, or undesired release of substances, but also during parties or smoking indoors.

The following measures contribute to the reduction of moist in the home:

- Heat the home and reduce temperature variations to 5 °C between minimum and maximum
- Ensure continuous ventilation through grates and cantilever windows
- Open a window during cooking. Use a cooker hood or another discharge system
- Dry the walls and floor after showering and leave the window open for at least one hour afterwards
- If the bathroom does not have a window, leave the bathroom door open for at least one hour ensuring an open window in the adjacent room. Ensure (if possible) mechanical suction.
- Ventilate well when doing the washing
- Preferably sleep with a window or door open and air the bedroom in the morning for half an hour
- Open a window in a crowded room
- Ensure that the mechanical ventilation system is checked annually

(N.B. Provide adequate security facilities to the windows).

5.3.1.2 *Open combustion appliances*

Open combustion appliances are systems, which use air from the immediate environment to function. Examples are: bathroom or kitchen geyser, gas cooker, fire place, multi-burner, coal heater, oil heater, gas heater, petrol heater, or calor gas heater.

Risks: 1st priority

Households that use open combustion appliances have an increased risk of the release of hazardous concentrations of combustion products. This is usually caused by a lack of fresh air flowing to the appliance causing incomplete combustion, or leakage in the drain of combustion gasses. In the Netherlands, the annual fatal carbon monoxide poisoning rate is 50 (carbon monoxide occurs with incomplete combustion). Other combustion products and fine dust particles may cause respiratory symptoms in patients suffering from asthma or COPD, and in elderly people.

Control

Ensure sufficient air supply by not closing windows completely, ventilation openings, and such. Also ensure annual maintenance of combustion appliances.

5.3.1.3 *Smoking and passive smoking*

Risks: 1st priority

The combustion products released by smoking are detrimental to health. Smoking inside the house causes higher concentrations of hazardous substances in the air. Non-smokers are also exposed to this (passive smoking). Exposure to cigarette smoke is undesirable for everyone and increases the risk of lung cancer. Asthma and COPD patients can even suffer from acute respiratory symptoms.

Control

It is recommended not to smoke in the house, but to step into the garden or onto the balcony. If smoking inside the house cannot be avoided, extra ventilation is required. In order to reduce exposure to the substances released as much as possible, a window should be opened prior to smoking.

5.3.1.4 *Radon*

Risks and control: 2nd priority

People who live on the ground floor are inevitably exposed to radon. Due to its radioactive nature, radon is hazardous to health. It has been calculated that in the Netherlands some 10 patients die of cancer annually, due to radon exposure. To some extent this could be prevented by sealing off cracks in the floor and adequate ventilation of the crawl space.

5.3.1.5 *Do-it-yourself*

Risks and control: 2nd priority

In many situations do-it-yourself jobs in the house lead to increased concentrations of chemical substances or physical contamination of the indoor air. This may involve fine dust, asbestos, or so-called 'man-made-mineral-fibres' (for instance mineral fibres and rock wool) released during sawing, sanding, and grinding. Paint and other materials, such as glue, sealant, etc. release volatile organic compounds.

Depending on the type and extent of exposure, health problems may occur. Protective breath measures and extra ventilation are required. If possible, avoid working with 'man-made-mineral-fibres', but call in a professional (in general, ventilation is insufficient protection against the hazards involved in fibre work). People who frequently work with glue, paint or plaster, may contract contact eczema.

5.3.1.6 *The crawl space*

Risks and control: 3rd priority

The crawl space of a house is often lacking in ventilation and is therefore quite damp. It can also be mouldy or contaminated with faeces of rats and mice, or, in the case of a defective drain, with human faeces as well. The

soil could also be polluted. Trying to do your own repairs would get you exposed and possibly contaminated. As a stay in the crawl space will generally be short and incidental, the health effects will be limited.

5.3.2 Indoor air treatment

5.3.2.1 Air conditioning

Risks and control

2nd priority

Modular air conditioning discharges heat through water. A water collecting point is an ideal location for various micro-organisms. If this water is aerated through aerosols, YOPIs will run the risk of infection.

3rd priority

Permanent or modular air conditioning can become contaminated by growth of fungi and bacteria, house dust mites, storage mites, and dust lice. As a result people can come into contact with allergens, antigens, and organic dust.

The air conditioning system may become a hiding place for cockroaches and silver fish. Insulation wool can contain clothes moth, and carpet beetles.

It is recommended that air conditioning installations are only used when absolutely necessary, and that they are maintained meticulously.

5.3.2.2 Ventilating

Risks and control: 3rd priority

Ventilation can lead to complaints from the residents about draught. It makes them feel uncomfortable, although no health risks are involved.

Balanced ventilation is rarely applied in the homes (contrary to mechanical *suction*). If with mechanical ventilation the air is recirculated (intentionally or not) there is a risk (particularly with inadequate filters) of increased dust, organic dust, micro-organisms, fungi, mites, and airborne dust lice. Mechanical ventilation ducts could serve as a hiding place for pests. Insulation wool may contain clothes moth and carpet beetles. Regular maintenance is required.

5.3.2.3 Heating: 3rd priority

Heating the air

Heating and ventilation can make the air dry. In the Netherlands, extremely low relative humidity (less than 30 %) is very rare. In the home this could only occur during winter after a long period of frost. With less than 30% relative humidity, the mucous membranes become very dry which causes symptoms such as thirst, soar throat, and stinging eyes. Dry air also causes spontaneous generation of electromagnetic fields (hair becomes static): the moisture in the air drains away the static load.

Despite the fact that the relative humidity in the Netherlands is only rarely very low, symptoms such as stinging eyes are frequent. Apparently these symptoms occur at relative humidity levels of up to 60%, but they are connected to the presence of excess airborne dust rather than dry air. Proper ventilation and thorough cleaning of the areas is required.

Heating the rooms

When storing wood for the open fireplace, fungi present on the wood may enter the indoor air. COPD and asthma patients could be allergic to fungi allergens. Combustion products of brunt wood contain various types of hazardous substances, such as PAH. When burned, wood obtained from demolition works may form dioxins, which end up in the house as well. Extra ventilation is vital when burning wood in the fireplace.

High efficiency boilers produce combustion gasses (such as nitrogen dioxide) which have a low temperature (hence the word high-efficiency) and are heavier than air. Therefore, particularly when there is little wind, these

gasses are able to settle, even though they leave the chimney high on the roof. The gasses may re-enter the house through open windows, which could have health consequences for people suffering from COPD or asthma.

5.3.2.4 Air humidification

Risks and control: 3rd priority

If there is insufficient ventilation around a humidifier (see 5.3.1.1), the house will probably become too moist allowing growth/reproduction of bacteria, fungi, and mites. If the liquid inside the humidifier itself is contaminated, fungi and bacteria (such as *Legionella*) will grow releasing endo and exotoxins. Inhalation by the residents of aerosols can cause exposure to these substances and affect their health.

In the Netherlands, air humidification (radiator water reservoirs, wet towels, or humidifiers which disperse water) is superfluous and therefore not recommended. Most symptoms are based on excess dust in the air. Therefore, it is recommended to increase ventilation instead of humidification.

5.3.2.5 Air purification

Risks and control: 3rd priority

There are build-in and modular air purification installations, which either use water or filters. Ionisation equipment for air purification is never build-in.

Ionisation equipment serves to obtain 'fresh air'. The ozone, which is produced by the equipment, does smell like fresh air, but exposure to ozone is associated with various negative respiratory effects. Therefore, the use of these appliances is not recommended.

There also exists equipment which washes the air with water, or filters the air (using a filter or whirlpool). Both systems could be vulnerable to microbial growth after some time. When washing the water, the micro-organisms are blown into the air in an aerosol. With air filtration, the micro-organisms will reproduce on the filter and start forming spores on the clean side. These releasing micro-organisms could be allergenic or irritable to people susceptible to this. (For more information on *Legionella* contamination, refer to 5.2.2.3).

To prevent the air becoming more concentrated with pathogens and allergens by using such installations, the filters or water should be regularly cleaned or changed. Otherwise the remedy is worse than the disease.

5.3.3 Pests

5.3.3.1 Risks and control: 2nd priority

If the indoor air is warm and moist, *cockroaches* feel right at home. If the indoor air is warm and relatively dry, this is ideal for the fire brats. If the indoor air is moist, this will attract silver fish.

These three types of pests can cause allergic reactions. Moreover, cockroaches can cause the transmission of pathogenic micro-organisms.

The occurrence of silver fish can be prevented by adequate ventilation and heating, see 5.3.1.1. Cockroaches and fire brats, on the other hand, cannot be prevented if an object contaminated with this pathogen is taken into the house. For other measures against pests, see 5.6.1.1.

5.4 Home Furnishings

This paragraph describes the hazards connected to the material used for home furnishings.

5.4.1 Selection of material

5.4.1.1 Risks: 1st priority

The hazards involved in home furnishings are those related to indoor air: growth/reproduction of fungi, mites and bacteria, and the allergens, exotoxins, and endotoxins they release. Growth/reproduction particularly occurs in textile carpeting, textile sofas, chairs and mattresses. These objects serve as active reservoir: the agents mentioned are taken in, reproduce (grow), and are released when used or touched, which means the user is exposed to them. Curtains, roman blinds, and venetian blinds are passive reservoirs: they take in allergens and organic dust, and release them when touched.

Control

The basic control measures are adequate ventilation and heating (see 2.4) and regular cleaning and drying. If adequate ventilation and heating appears to be impossible, additional cleaning is required.

Asthma and COPD patients are advised to follow the guidelines drawn up by the "Nederlands Astmafonds [Dutch Asthma Fund] (NAF guidelines)".

Cleaning

Apart from regular maintenance (vacuum cleaning), textile carpeting should be thoroughly cleaned with an appropriate and allowed agent once a year, and left to dry afterwards. Curtains should be washed once a year; Venetian blinds and other blinds should be cleaned regularly.

5.4.2 Maintenance

5.4.2.1 *Risks and control: 2nd priority*

When maintaining the interior such as furniture, floors, etc. use can be made of (pungent) wax, detergents, and other cleaning and maintenance products. People who find these odours irritating are advised to use neutral or almost neutral maintenance products and to ensure proper ventilation during cleaning and waxing.

5.4.3 New furniture

5.4.3.1 *Risks and control: 3rd priority*

New furniture can contain chemical compounds (for instance formaldehyde in chipboard) that are released into the indoor air. Although their concentration is temporarily increased, this will gradually disappear with time if the room is sufficiently ventilated. People who are sensitive to these compounds, may suffer from irritation.

5.5 *Pets*

5.5.1 Introduction

Over 50 % of Dutch households have a pet. In general, pets give pleasure to the family and contribute to their well-being. Although keeping pets involves a number of risks, proper care can reduce them. The following paragraphs will primarily discuss the microbial risks connected with the presence of pets. The positive effect pets have on family members will not be covered in this paragraph as this is outside the scope of this code.

People who are susceptible to allergens could become allergic by keeping a pet in the home. Correct and proper care of the pet will not prevent this. One cannot always predict whether a person is allergic to certain allergens; exposure to an allergen could (after some time or immediately) provoke an allergic reaction. The risks caused by allergens will be discussed in the following sections.

Dogs and cats are the most popular pets. They are often allowed anywhere in the house. The risk hazards as described in this paragraph will be largely related to these animals. Naturally, hygiene is important with other animals as well. This paragraph deals with all animals brought and kept in the home by residents. The consequences of poisoning by certain animals (such as snakes, toads, etc.) could be serious, but this is a rare occurrence. It is assumed that the keepers of such animals are familiar with the risks connected with the particular animal and this subject is therefore not included in this code.

The hazards connected to the presence of domestic pets are mostly caused by zoonotic agents by whom humans can be infected. Examples are *Salmonella* (present in dogs and turtles) and *Chlamydia psittaci* (present in birds and may cause pigeon breeder disease or parrot disease in humans). Prior to the description of the various risks, there is a brief description of two parasites which frequently occur in dogs and cats, and (because of them) in the garden as well (see 5.9). Provided proper measures are taken, the risk of contamination with these parasites is small (see 5.5.2).

Toxocara (round-worm)

Roundworm naturally occurs in dogs and cats. Through faeces, the eggs of roundworm are brought into the interior environment. After two weeks of maturing outside the body, they are contagious. If they end up in the intestinal tract of humans, they will develop into larvae which are capable of entering various organs. Usually the affliction is benign and short, but the infection can be long-term and lead to unrecognised symptoms. Recent

investigation has shown that children susceptible to asthma more often contract respiratory problems if contaminated with roundworm.

Toxoplasma gondii

Apart from raw or under heated meat, the parasite can also come from cat's faeces. The *Toxoplasma* eggs need a few days to mature. Infection often occurs without symptoms, but could also cause various vague complaints. The infection is dangerous to unborn babies who can be contaminated through the blood of the mother. The baby could even obtain serious disorders of the nervous system (hydrocephalus) and the eyes (blindness).

5.5.2 Presence of pets in the home

5.5.2.1 Risks: 1st priority

The presence of pets involves a higher risk of infection (cross-contamination). Pets can be carriers of zoonotic agents (bacteria, viruses and parasites) which could cause an infection (zoonosis) with human beings. Contamination of food with zoonotic agents can lead to food intoxication or food infection.

Depending on the type of pet, the caretaker and family members are either directly or indirectly exposed to dermatophytes, respirable and organic dust (particularly with birds) and/or skin flakes. This way, the presence of pets can lead to allergic reactions in people who are sensitive to this.

Exposure to zoonotic agents and/or allergens can occur by direct contact with the animal, through the hands, surfaces, and food or through airborne dispersion. The chance of exposure is bigger when the animal walks or flies around the house unrestricted.

Exposure can occur in the following situations:

- While cleaning animal facilities /bowl/pen
- During play, petting (licking) or taking them into bed
- During care or washing its skin, hair or feathers
- During cleaning of faeces (for instance cat litter, 'accidents', poop scoop)
- By injuries caused by the pet (for instance scratches (scratch disease) or bites)
- During shaking of a dog after a swim (aerosol).

Control

Before buying a pet, one should carefully consider which type of pet is best. Their degree of allergen load and the expected sensitivity of family members should be taken into consideration. Some animals (such as cats) are known to cause allergic reactions while other animals, such as birds, produce a lot of respirable and organic dust, which is capable of causing allergic reactions as well.

In order to discharge the increased production of dust and allergens caused by the presence of pets, extra ventilation (an air change rate higher than 2.5) is required. If extra ventilation is impossible, extra cleaning is required.

The risks of *Toxocara* can be eliminated by frequently unworming dogs and cats: grown dogs and cats every six months and puppies and kittens more often. Provided worming is performed correctly, the risk of *Toxocara* eggs is negligible.

To prevent the risk of contamination with *Toxoplasma* in so far as is possible, the litter tray should be cleaned every day, after which the hands should be thoroughly washed unless disposable gloves are used. This way, any *Toxoplasma oocysts* (embedded fertilised germ cells) present are prevented from developing and becoming infectious.

Pets need regular care. Care of skin, hair or feathers should preferably take place outside, as does cleaning the pen. This prevents contamination of the home. In any event, do not clean pets and their facilities in the kitchen. Prevent dirt and dust from these facilities from dispersing: it is full of micro-organisms and allergens that could cause infection or allergic reactions if inhaled.

Preferably wash the hands after contact with pets or their facilities. If not, in any event avoid touching the face. Always wash the hands prior to or during food preparation after touching a pet.

Prevent contact with animal faeces. The risks of contact with faeces is great during cleaning of the cage or when the pet is ill or not clean, especially when they walk around the house unrestricted. Birds in particular leave faeces everywhere. The following measures are essential:

- Always wash the hands after contact with faeces

- Ensure daily discharge of faeces: they can cause cross-contamination and attract pests such as cockroaches and flies. These can transmit zoonotic contamination from the faeces to human beings or their food.
- If human food comes into contact with zoonotic agents from faeces, this may cause food infection. Therefore, it is advisable to ban pets from the kitchen. If this is not possible, (for instance with an open kitchen) the worktops should be cleaned prior to food preparation. See 3.5.1.

5.5.3 Cleaning

5.5.3.1 *Animal facilities: 2nd and 3rd priority*

If a pen is not, too little or insufficiently cleaned, the number of micro-organisms, pests, parasites and allergens will slowly increase. Dog houses, cat boxes and bird cages should be regularly cleaned using an all-purpose cleaning agent or a special cleaning agent (see Appendix 'List of (surface) cleaning agents and their application'). To clean animal facilities, use cleaning tools (such as a brush) that are only used for this purpose. Clean and dry them after use. Put cloths in the wash after use (all-in-one detergent at 60 °C). Pregnant women and people suffering from asthma or COPD are advised not to clean the facilities.

Wash the rugs used by pets weekly at 60 °C using an all-in-one detergent.

During cleaning the facilities the hands are contaminated with the (faecal) micro-organisms present and should be washed afterwards.

Prevent the content of the facility to disperse during cleaning. Some type of cat litter is worse than other types; use a type that is not so dusty. Keep the litter tray away from children.

Food bowl

If the food bowl is emptied in one go, it should be cleaned with hot water and soap immediately. Rinse with hot water first, if the food is raw. If the food bowl is left uncleaned, remaining bacteria will reproduce and are able to cause cross-contamination, for example with young children in the house. This can also attract pests.

Food bowls that are constantly full and continuously refilled should be regularly (at least once a week) cleaned out and filled with fresh food. This prevents cross-contamination from old to new food and growth of micro-organisms.

Washing

Routine use of shampoos containing drugs is not recommended, as it may lead to the selection of resistant pathogens. Similar products should be used on medical grounds only (zootherapeutically; when the animal is actually ill). Using the products involves a risk of inhalation and sensitisation of the skin. There is no objection against special animal shampoos. These mainly have a cosmetic effect and do not remove any zoonotic agents.

Anti-parasitic agents

Parasites and pests are *not* removed by proper washing practice. You need anti-parasitic agents, such as drops, flea collars, or injections. Applying drops or flea collars involves the risk of exposure to the active substance. In hot weather conditions, the ingredients in the flea collar can leak. It is advisable to consult your vet on this, especially when there are small children in the house.

5.5.3.2 *Food: 3rd priority*

If dry food is not adequately sealed off, stored in a damp place or too long, fungi and mites can start to grow. Improperly sealed packages of dry food attract mites, beetles and rodents. Therefore, do not buy large-size packages of dry food and apply the FIFO system (First In First Out). Preferably store (opened) packages in properly sealed plastic containers or buckets, or in tinned containers. Rodents are capable of transferring a parasitic infection to the food.

Various types of animal food can also be allergenic. For susceptible individuals keeping fish is often a good alternative, although it should be considered that fish feed or fish flour in itself is allergenic. Apart from that, it attracts storage mites and fungi, which can be allergenic as well. Using a feeder can reduce allergenic reactions. Life feed for various types of pets (tubifex, red mosquitoes, worms, and rodents) or their excrement can be allergenic to susceptible individuals.

5.5.4 Playing

5.5.4.1 Risks and control: 2nd priority

Playing, stroking or taking a pet on the bed involves substantial risk of contamination. It also includes the risk of contamination with *Toxocara*. When playing and stroking the pet, there is a risk of injuries (e.g. scratches or bites). Similar injuries can cause an infection due to contamination of the animal itself (for example the 'cat scratching disease') and should therefore be prevented. If you get injured by a pet, wash properly (Also see 4.13.2.).

5.6 Pests

5.6.1 Presence of pests

5.6.1.1 Risks: 1st priority

Pests such as cockroaches, fire brats, silver fish, rats, mice and flies can function as transmission route of zoonotic agents and contaminate food with pathogenic micro-organisms and viruses.

Cockroaches, fire brats and silver fish also carry specific allergens. Birds keeping their nest under roof tiles, can be a source of allergens, micro-organisms (for instance *Salmonella*), mites and respirable dust if they end up in the indoor air through the roof boarding.

Control

The measures should be specifically aimed at pest prevention. The presence of silver fish, fire brats and cockroaches is connected to the humidity and temperature of the interior. One of the main measures to keep these pests at bay is proper ventilation and proper heating in winter (see 5.3).

Furthermore, it is important to keep food or food remains properly sealed. Waste and food attract pests. Therefore, waste should be kept separate and the house (in particular the kitchen) should be cleaned regularly. Food products (in particular opened packaging) should be properly closed.

Some pests can be kept from the house by using physical barriers. For example window screens keep flies at bay and filling in wholes prevents rodents and cockroaches from entering the house.

If these measures appear to be insufficient, pest control is required (see 5.6.2).

5.6.2 Pest control

5.6.2.1 Risks and control: 3rd priority

If the number of pests increases such that there is question of a plague, chemical pesticides can be used. Some pesticides can be applied by non-professionals, provided that only allowed products are used and that the user instructions are followed carefully, although professional pest control service is recommended. They will use to proper pesticide in the proper way.

5.7 Water

5.7.1 Tap water

It is important to be familiar with your own water pipes (material and locations) in order to take the correct measures.

5.7.1.1 Microbial quality

Risks and control: 2nd priority

The Water Company guarantees the (microbiological) quality of the water until the draw-off point. If water has been stagnant for more than 48 hours (after a long weekend out or a holiday) there is a chance that the number of bacteria has increased and the microbiological quality of the water is not sufficient. This particularly applies to warm water and water pipes located close to the central-heating boiler. *Legionella* is one of the potential pathogens that are particularly hazardous when inhaled (see 5.2.2.3). If the water pipes have been stagnant for

some time, it is advised to let the water flow until the desired (warm or cold) temperature has been reached before using the water.

5.7.1.2 Chemical quality

Risks and control: 2nd priority

If the water pipes in your house contain lead (especially in old houses), in most cases the lead content of the water is increased. The same applies to the copper content of water running through copper water pipes. In the event of soil pollution near the house and plastic water pipes, organic pollution, such as organic solvents, can end up in the tap water.

Metal ions, such as copper ions where there are copper water pipes, dissolve quicker in warm water than cold water. In order to prevent the risk of excess lead or copper intake, it is not advised to drink warm water from the tap. Water, which is stagnant in the water pipes for some time (at night, during a weekend or holiday) is likely to contain dissolved metal ions. To remove them, let the water run for some 20 seconds before use.

5.7.1.3 Warm water

Risks and control: 2nd priority

If warm water is produced by a boiler, the boiler temperature should be set to a minimum of 65 °C. Lower temperatures (also if they are temporary) increase the risk of reproduction of the *Legionella* bacterium inside the water pipe system (see 5.2.2.3.).

5.7.1.4 Water purification

Risks and control: 3rd priority

If water is purified (for instance with a carbon filter or a water-softener) there is a risk of microbial growth on the filter. The micro-organisms can subsequently contaminate the water. Therefore, it is advised to clean the filter after similar appliances have been used.

The use of a filter is not required for health reasons.

5.7.2 Water well

5.7.2.1 Risks and control: 3rd priority

If a water well is used as tap water supply, there is a risk of chemical contamination by local soil pollution and pesticides. There is also risk of microbial contamination.

Therefore, it is safer to use tap water supplied by water pipes. If a water well is used, ensure regular testing of the water quality.

5.7.3 Domestic water

5.7.3.1 Risks and control: 3rd priority

Domestic water (grey water) is water which has undergone a shorter purification process than ordinary tap water. For an environmental point of view it is better. However, research into the possible health hazards is still insufficient. Domestic water, however, contains relatively more *Legionella* bacteria than ordinary tap water. Therefore, it should only be used for washing or flushing the toilet and not for activities such as spraying the garden or washing the car. Inhalation of contaminated water particles is a health risk. It is recommended to close the toilet lid when flushing with domestic water (4.14.1.1).

5.8 *Indoor plants*

5.8.1 Risks and control

5.8.1.1 *2nd priority*

Indoor plants can be poisonous in various ways: through skin contact either or not combined with sunlight or after swallowing. It is recommended to be very careful when maintaining and touching plants, especially around children. Other plants cause allergic reactions in some people (for instance the dried rubber sap of the phylactery types). Ask the retailer for advice.

3rd priority

If a house or a room is packed with plants (inner garden) the atmospheric humidity increases dramatically. In addition, (green) plants use oxygen during the night. Therefore, a house with many plants requires extra ventilation.

5.9 *Garden*

The garden backs on to the house. This paragraph deals with gardens used as a playground for children and as a place where outdoor plants and vegetables grow and are being maintained.

5.9.1 Child's play

5.9.1.1 *General: 3rd priority*

Children can ingest pathogens and contaminant through hand-mouth contact or sucking. When applying pesticide in the garden, it should be noticed that toys and climbing equipment are avoided or cleaned afterwards. Dog and cat dirt can contain *Toxocara* and *Toxoplasma* which may cause infections with children after hand-mouth contact during play.

5.9.1.2 *Sand box: 2nd priority*

An increased risk of contamination with for instance faecal bacteria exists with children playing in a sand box. This may be a zoonotic contamination from dogs, cats, birds or pests leaving their faeces in the sand box, which particularly causes cross-contamination of *Toxocara* (round-worm) and *Toxoplasma* (see 5.5.1), the eggs of which are capable of surviving for months. Apart from animals, children themselves cause the sand box to become contaminated by food, drinks, faeces or urine.

As the sand box is usually quite damp and contains organic material, development of pathogenic micro-organisms is likely.

In order to prevent such contamination from occurring, the sand box should be closed after use. Children should wash their hands after playing and particularly before sitting down at the table. It is also recommended that the sand in the sand box be renewed at least once a year.

5.9.1.3 *Inflatable swimming pool: 2nd priority*

When using an inflatable swimming pool, the water is likely to become contaminated with micro-organisms from the body, the ground, bird droppings, etc. After some time the micro-organisms will reproduce, especially in hot weather. Some of these micro-organisms can be pathogenic. In order to reduce contamination with pathogen (after reproduction) it is recommended that the water be refreshed at least once a day.

5.9.2 Working in the garden

5.9.2.1 *General*

2nd priority

When working in the garden, micro-organisms and parasites (i.e. *Toxoplasma*) in the ground can contaminate the hands. Therefore, hand-mouth contact should be avoided, because when taken in similar organisms can be detrimental to the health, in particular to YOPIs. Wash the hands properly afterwards. Keep your nails short and preferably wear gloves.

3rd priority

When the hands are injured while working in the ground (for instance due to some sharp object) there is a slight risk of tetanus. The consequences, however, are very serious. Despite the tetanus injection programme in compliance with the 'Rijksvaccinatieprogramma tegen tetanus' [State Vaccination Programme against tetanus] it is recommended to contact the general practitioner or first aid station to determine whether a second injection is required.

By using gloves the risk of injuries and potential contamination can be prevented as much as possible.

5.9.2.2 Compost: 2nd priority

By producing, constructing and using a compost heap the gardener is exposed to endotoxins and fungi, bacteria, viruses and parasites that could be infectious or allergenic. For the proper use of compost heaps read the guidelines drawn up by the "Belangenvereniging Verwerkingsbedrijven Organische Reststoffen (BVOR)" [Interest Group Processing Companies Organic Remains].

In any event do not use the compost from a compost toilet for fertilising gardens. This causes a considerably higher risk of parasitic infections.

5.9.2.3 Maintenance and pavements

2nd priority

When cleaning the garden pavements with a high-pressure sprayer, it is recommended to use ordinary tap water (in stead of domestic water, water from rain barrels or ditches). Also see 5.7.3.1.

5.9.2.4 Fertilisation: 3rd priority

Fertilising the garden with manure can cause contamination with pathogens. When using artificial compost there is a risk of irritation due to dispersion of this compost.

5.9.2.5 Vegetable garden: 3rd priority

If vegetables are grown in the garden for private consumption, the cultivator should be absolutely sure that the soil is not polluted with, for instance, heavy metals. The consumption of vegetables grown on polluted soil can cause increased exposure to contaminants. When in doubt, send in a soil sample. In general, the direct living environment will not be contaminated with heavy metals and such. If it is, other problems may occur as well.

Pesticides should not be used shortly before harvesting. This increases the risk of residues in the vegetables. Carefully read the instructions for use and act accordingly.

For consumption of home grown vegetables, also see 3.6.2.1.

5.10 Waste

5.10.1 Household waste: 2nd priority

Household waste is an excellent breeding ground for micro-organisms. In particular, when stored at room temperature, as is frequently the case, micro-organisms multiply best. The presence of organic waste⁷ in de house leads to an increased concentration of bacterial endotoxins and fungal products. Some health problems can be linked to the aforementioned substances. An increase in the concentration of these substances should be prevented by keeping the time that organic waste spends inside the house as short as possible. Emptying a small organic waste container into a large container, causes a risk of exposure to large numbers of fungal spores. Always place the large organic waste containers outside (in the garden or on the balcony). If this is not possible, it is recommended not to separate organic waste and 'ordinary' waste at all. This leads to reduced exposure (reduction of indoor exposure in particular).

Organic waste should not be dumped in plastic bags. To absorb seeping liquids and prevent waste from sticking to the bottom, old news papers can be used: place a newspaper on the bottom and use them to wrap small portions of waste. Do not include meat (remains) with the organic waste.

⁷ Organic waste as source of microbial air pollution. Series of publications on waste, no. 1998/44. "VROM"

5.10.2 Garden waste: 3rd priority

If garden waste is not cleared away, it will cause a temporary increase in fungi and pests. This is enhanced when the temperature is high and the waste accessible. Also see 5.9.2.2.

5.10.3 Household chemical waste: 3rd priority

If household chemical waste is stored too long, damaged or improperly closed chemicals will release. This increases the risk of contact with or inhalation of the chemicals, which may affect the health. Household chemical waste should be closed and ventilated properly. If possible, store it outside (in the garden, on the balcony or in the shed). Discharge it regularly or as quickly as possible.

5.10.4 Glass and used paper: 3rd priority

It is better to remove rough food remains from glass before disposal. Rinse the glass and let it dry (do not replace any lids). The fungi and bacteria will start to sporulate when the food remains dry in. Apart from that, they attract pests. Injuries caused by polluted glass, for example while clearing it away or taking it to the refuse tip, carry a higher risk of an infection. Ensure that used paper is free of food remains before storing it.

Discharge the waste regularly. If used paper is kept in store for a long time, it will attract rodents, fire brats and small insectivores who will use it to hide or nestle.

5.10.5 Other waste material: 3rd priority

If waste from construction or demolition works, hobbies and DIY materials, carpeting or surplus furniture is stored in a quiet, unheated place (such as in the attic, basement or shed) they form an ideal hiding and nestling place for rodents. Fungi and other pests also thrive in these conditions. Re-use of the stored material in the home, will bring in the fungi, mites and any rodent as well.

6 Appendices

Definitions

This list contains definitions of terms used in this document and placed within the context of this document.

Term	Definition
Aerosols	Microscopically small liquid particles caused by sneezing, coughing, speaking or flushing the toilet.
Agent/agents (pl.)	A substance that is able to cause a chemical or biological reaction.
Air change rate	The number of times the air in a room is refreshed per hour.
Airing	Temporary extra air movement, which may be required in domestic activities releasing large quantities of moist or unwanted substances.
Allergen	Substance foreign to the body, although in itself to be considered innocent, to which the human immune system reacts in an undesirable manner.
All-in-one detergent	Laundering agent containing bleach.
Antigen	A chemical structure (compound) that is considered foreign to the body and stimulates the production of antibodies.
A _w water activity	The amount of water available for micro-organisms in a food product.
Caries	An infectious disease to the teeth resulting in cavities in teeth or molars caused by insufficient rebuilding of enamel after frequent acid attacks.
Chance	Likelihood; often proportioned to frequency.
Chemical disinfection	Disinfecting by means of chemicals.
Chemical hazard	Reaction or contamination involving the arise or introduction of health threatening chemical substances.
Cleaning	Removal of dirt, organic material and micro-organisms using a wet or dry tool.
Cleaning agent	Agent used to remove dirt, organic material and micro-organisms.
Cloth used for cleaning	Cleaning tool; piece of fabric usually damp used wet to wipe surfaces.
Contact surfaces	Surfaces that are frequently touched with parts of the body.
Contamination	Transmission of agents (micro-organisms, chemicals) from one place to the other (to food, surfaces, tools, hands, etc.).
Contamination	The ending up in or on food stuff of product-foreign substances or micro-organisms.
Control	Collection of measures aimed at preventing or minimising particular hazards.
Control measure	Measure aimed at preventing or minimising particular hazards.
Cool down	Reducing the temperature.
Cooling	Cooling down of a food product after it has been heated.
Cooling rate	Rate at which the temperature decreases during cooling.
COPD	Abbreviation for Chronic Obstructive Pulmonary Disease; combination of chronic bronchitis and emphysema.
Coughing discipline	The systematic habit of <i>always</i> covering the mouth with the hand when coughing and sneezing.
Cross-contamination	Transmission of micro-organisms from a contaminated location to a location which is not or no longer contaminated, usually through an object or the hands (wider definition than usually applied).
Decay	The decrease in quality of food by microbiological, chemical and/or physical causes.
Deep-freezing rate	Rate at which the temperature decreases by deep-freezing; time period needed to freeze the complete product.
Dermatophytes	Fungi that are able to cause skin infection.
Detergents	Cleaning agents, laundering agents, soapy compounds.
Dishcloth	Cloth for use in the kitchen.
Disinfecting	Reducing the number of micro-organisms to an acceptable level.
Domestic water	See 'Grey water'.
Endotoxins	Cell wall ingredients of gram-negative bacteria with a strongly pro-inflammatory effect, which could cause respiratory health symptoms.
Enteritis	Disorder of the intestine caused by infection of pathogenic micro-organisms possibly causing abdominal cramp and diarrhoea, sometimes combined with fever.
Exotoxins	Toxic proteins produced in the food during the reproduction of certain micro-organisms.

Term	Definition
Food allergy	A reaction causing the immune system of the body to produce antibodies to certain proteins in the food (for example proteins in cow's milk or peanuts).
Food care	All activities related to food: buying, transporting, storing, preparing, serving, and consuming.
Food infection	Infection by pathogenic micro-organisms that have entered the gastro-intestinal tract through food, nestle there and cause damage.
Food intolerance	Symptoms caused by the consumption of certain food ingredients; with these symptoms the immune system does not play a role (also see Food allergy).
Food intoxication	Symptoms caused by the consumption of food containing toxins (poisonous substances) excreted in the food by micro-organisms.
Furnishings	Anything not belonging to the body of the house: furniture, carpeting, curtains.
Gastro-intestinal infection	Infection of the gastro-intestinal tract by pathogenic micro-organisms, involving abdominal cramp, vomiting, fever, and diarrhoea.
Grey water	Water which has undergone a shorter purification than ordinary tap water, and which is intended for use in washing machines and toilets. Is not suitable for other consumption purposes.
HACCP	Hazard Analysis Critical Control Points. Inventory of potential hazards and identification of certain measures aimed at controlling the hazards involving the highest risk. HACCP is applied in the food industry.
Hand disinfectant	Disinfectant to be applied to the hands, usually based on alcohol and a degreasing agent.
Hazard	Health threatening situation or event.
Hazard analysis	Inventory of all possible hazards.
Health risk	Hazard with a certain likelihood of occurring.
Health threatening	Possibility of irritation, becoming unwell, illness, injury, allergic reaction, death; may occur acutely or in the long term.
Home	Residence of human beings including garden or balcony.
Hygiene	A complex of measures and activities aimed at maintaining a clean environment and preventing illness.
Hygiene code	Document containing guidelines on how to achieve hygiene.
Inactivating micro-organisms	Destroying micro-organisms.
Indoor environment	Anything related to the indoor environment: indoor air, heating, furnishings and furniture, water supply, waste treatment, care of pets, use of the garden, and any pests.
Infection	A contamination with micro-organisms which are capable of maintaining and multiplying inside the body causing symptoms such as abdominal cramp, vomiting and/or diarrhoea.
Inflammation	Reaction of the body to a bacterial infection or chemical contamination: redness, pain, heat/fever, swelling and possibly loss of function. As infection and inflammation usually occur simultaneously, both terms are used.
Irritation	Itching, burning.
Leftover	Food leftovers; meal that has been served, but has not been used and is stored for later consumption.
Meal	Food which is prepared and ready to be consumed.
Microbiological risky products	Food products with an intrinsic contamination causing substantial risk of microbial growth; proper measures are critical to control this hazard.
Micro-organisms	Micro-organisms are organisms which, during their life cycle, undergo at least one period where one single cell individually multiplies. Micro-organisms are only visible through a microscope. Micro-organisms are bacteria, fungi, yeast and protozoans. Although not a living organism, viruses are usually also considered as micro-organisms.
Moist cakes	Cakes containing whipped cream, jelly, fruit, custard, cream and/or bavaois.
Moist wiping	Removing of dust and dirt using a cloth which has been wetted and wrung out so well that no water remains on the object.
Mycotoxins	Toxic substances (exotoxins) produced by fungi.
Organic waste	Waste consisting of vegetables, fruit and plant matter.
Oxidation	Reaction with oxygen; causes a change in the characteristics of the original substance.
PAHs	Poly-cyclic aromatic hydrocarbon; caused by burning food; detrimental to the health when swallowed.

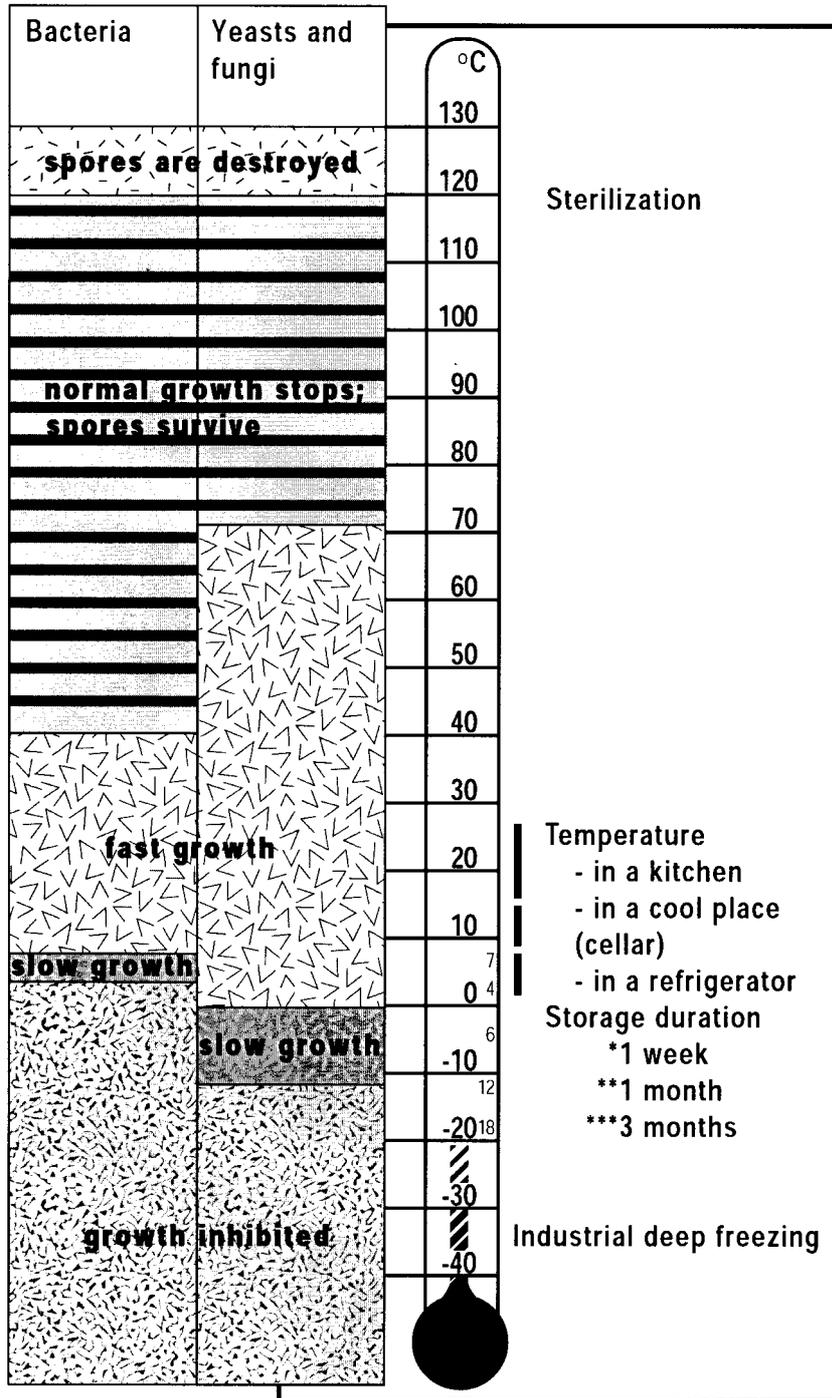
Appendices

Term	Definition
Pathogens	Micro-organisms capable of causing illness through infection or intoxication.
Personal care products	Products that can be used to care for the human body; usually intended for a specific body part such as skin or hair.
Personal hygiene	Complex of measures and activities aimed at the safeguarding of health, in so far as related to the human body.
Pests	Also referred to as vermin; animals which impose themselves into the home and use it for food supply, heat and shelter.
Pets	Any animal taken into the home and cared for by the resident.
Physical hazard	Pollution of food with foreign ingredients such as glass splinters and metal particles or with natural ingredients such as bone fragments or bones.
Phytophoto-toxic	Toxic as a result of contact with certain plant juices.
Preparation	Treatment of food stuffs to prepare a meal.
Prepared meals	Meals which are prepared in the home and are ready for consumption. Appear in various stages of food care if <i>not</i> consumed immediately; usually cooled down first, then temporarily stored, and reheated before consumption.
Primary raw materials	Food products which have not undergone any industrial process or preparation stage, such as vegetables, corn and raw meat.
Process	Series of sequential, corresponding activities.
Quality (of food)	Smell, colour, taste, looks, consistency, safety.
Radon	Specific type of gas releasing radiation, potentially causing cancer.
Raw material	Base material for preparing a meal.
Refrigerated fresh meals	Pasteurised meals that keep longer under refrigerated conditions.
Refrigerating rate	Rate at which the temperature is reduced.
Respirable dust	Dust which is able to pass the larynx and enter the lungs; particles smaller than 10 micrometer.
Risk	A combination of the possibility and seriousness of a specific hazard.
Risk estimate	Estimate of the possibility and seriousness of a specific hazard based on scientific data and experience.
Sanitary	Toilet, bathroom.
Sanitary hygiene	Complex of measures and activities relating to the sanitary appliances (toilet and bathroom) aimed at maintaining a clean environment and preventing (the spread of) disease.
Scabies	A highly contagious skin infection caused by a mite and characterised by intense itching.
Scraping	Removing food remnants from used crockery.
Sensitisation	Incidence of irritation caused by regular exposure to a certain substance.
Seriousness	The extent to which health is threatened.
Serving	Putting meals on the table intended to be consumed.
'SOA' Stichting	'Stichting Seksueel Overdraagbare Aandoeningen' [Foundation for Sexually Transmitted Diseases or STDs].
Special purpose cleaner	Cleaning agent active in specific situations.
Spores	Minimal life forms of micro-organisms; are capable of surviving certain extreme situations (for instance drought or heating) and developing into ordinary (vegetative) cells once the environment is favourable again.
Sterilising	The destruction of all micro-organisms at a temperature of 120 °C.
Store in a cool place	Storing in the refrigerator at temperatures below 7 °C.
TGT date	Dutch abbreviation for 'use by' date; indicating the ultimate date for consumption.
Thermal disinfection	Disinfection by heating at temperatures over 70 °C.
THT date	Dutch abbreviation for 'keep until' date; indicating the ultimate date to which product quality is guaranteed.
Tools	'Utensils' used to perform certain tasks, for instance kitchen tools and cleaning tools.
Toxins	Natural poisonous substances.
Ventilation	Continuous air movement through the house with an air change rate of at least 2.5.
Washing	Cleaning with water and a washing/cleaning agent.
Washing-up	Cleaning method for crockery, kitchen utensils, pans; to be performed by machine or hand; cleaning occurs by the combined effect of higher temperature, washing-up product, and mechanical forces.
Wiping	'Lightly rubbing' dust from the floor with a special impregnated cloth (cleaning).

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Term	Definition
Work tops	Surface on which certain operations or activities take place; for instance the kitchen work top (preparing food), table (consuming food), commode (changing a baby).
YOPIs	Abbreviation in English for: Young, Old, Pregnant and Immuno-compromised; collective term for people with a reduced resistance to illnesses such as Young children (including babies), Elderly people, Pregnant women and people suffering from compromised immunity (in Dutch: 'JOZI's').
Zoonosis	Illness caused by infection through a zoonotic agent.
Zoonotic agent	Collective term for bacteria, fungi, viruses and parasites present on animals and liable to cause an infection with humans.

Temperature and bacterial growth



A spore is a reproduction cell of a bacterium, which survives temperatures up to 120°C.

Source: "Gezond koelen en vriezen", Dutch Consumers' Association, The Hague 1996

Perishable food products and their shelf life

Product	Shelf life at 4-7 degrees C
Filet américain	0 ^{a)}
Mince meat and small raw meat products, such as hamburgers, mince meat, tartar, kromesky	1
Chicken liver or heart	1
Shrimps	1
Mussels	1
Vegetables, raw (not pre-packed), cut	1
Vegetables, raw, pre-packed, cut	see 'THT'
Potatoes, peeled, not pre-packed	1
Moist cakes (cream cake)	1
Fish	1-2
Sausage rolls	1-2
Soft cheese, for instance brie, camembert	2
Egg yolk or egg white	2
Chicken	2
Sliced meat: fricandeau, liver, paté, rolled meat, roast beef, tongue, ox-meat	2
Tinned sliced meat; after opening	2
Leftovers (vegetables, potatoes, pasta, rice, meat)	2-3

^{a)} Consumption on the purchasing date; the shelf life is indicated by the number of days (0, 1, 2 or 3) between the ultimate consumption date (or processing date) and the purchasing date (or preparation date).

Source: *Bewaarboekje*, Voedingscentrum [Netherlands Nutrition Centre], The Hague 1997, publication no. 147

Table - (surface-active) cleaning agents and their application

The table contains a number of application areas for clusters of (surface active) cleaning agents.

More information on cleaning agents and their application can be obtained from:

- Vollebregt L, Van Broekhuizen P (1994) Tussen wasmand and afdruipek, Chemiewinkel UvA, Amsterdam
- Vollebregt L, De Mooy R, Van Broekhuizen P (1994) De grote schoonmaak: totaal vernieuwd, Chemiewinkel UvA, Amsterdam

	Hall/ living room		Kitchen		Bathroom		Toilet
	Small surfaces	Floor	Work tops/ appliances/ sink	Floor	Bath/ Wash basin	Floor/ walls	
All-purpose cleaner	x	x	x	x	x	x	x
Special cleaning products							
Glass cleaner	x						
Acid cleaner			x		x	x	x Bowl ¹⁾
Liquid abrasive agent Agent (possibly containing hypo)			x		x		x Bowl ¹⁾
Thickened bleaching agent concentrated			x Drain pipe		x Drain pipe		x Bowl ¹⁾
Thickened bleaching agent diluted			x		x	x	x
Low Hypo Cleaning agent or cleaning agent with H ₂ O ₂ additive Concentrated ²⁾			x Sink	x Stain	x	x Stain	x Bowl ¹⁾
Diluted		x	x	x	x	x	x Seat
Disinfectant allowed			x see code ²⁾		x see code ³⁾	x see code ³⁾	
Spray cleaner	x		x				
Cleaning wipes			x				x Seat

¹⁾ Refer to chapter 4.14.1.1.

²⁾ Refer to chapter 3.5.1.1.

³⁾ Refer to chapter 4.15.2.

Examples from the market situation of July 1999

Project participants

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S.W. Josephus Jitta	VROM/IPC/P&C	●	-	-	-	●
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Mw. H. Kornblüt	Voedingscentrum	-	●	●	-	-
Mw. N.G. Kuyper-de Groot	Ned. Ver. Van Huisvrouwen	●	●	●	●	●
Ing. F.M. van Leusden	RIVM, MGB dep.	-	●	-	●	-
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Mw. ir. A. Mathijssen	Stichting Merkartikel	●	-	-	-	-
M. Mens	Werkgroep Detailhandel HACCP/ Visserijcentrum	●	●	-	-	-
L.R. van Nieuwland	Consumentenbond	●	●	●	●	●
Prof. dr. J. Oosterom	Wageningen Universiteit Researchcentrum/Huishoudelijke en Institutionele Hygiëne	●	●	● ^v	●	●
Mw. drs. A.J.M. van der Putten ^x	VWS/Inspectie W&V	-	●	●	-	-
Ir. H. Rang	Productschappen voor Vee, Vlees en Eieren (PVE)	-	●	-	-	-
Mw. ir. H. Schlötjes-Belle	Ned. Instituut voor Zorg en Welzijn (NIZW)	●	-	●	-	●
Ir. J.N. Schouwenburg	Productschappen voor Vee, Vlees en Eieren	●	-	-	-	-
H. Sinnige	NVZ ^b	-	-	-	-	●
Dr. R. van de Straat	NVZ ^b /Proctor & Gamble ECT	●	●	●	●	●
Drs. P.A.C. Stroek	NVZ ^b /Sara Lee/DE	-	-	-	-	●
Prof. dr. P.M.J. Terpstra	Wageningen Universiteit Researchcentrum/Consumententechnologie en productiegebruik/Huishoudstudie	-	-	-	-	●
Dr. ir. V.M.L. Vandepitte ^x	NVZ ^b /AISE/Proctor & Gamble ECT	-	-	-	-	-
Ing. G. Visser	VWS/Inspectie W&V	-	●	●	●	-
Mw. ir. F. de Vries-Pels	Voedingscentrum	● ^p	● ^v	●	●	●
Dr. J.H. van Wijnen	GG&GD Amsterdam	●	-	-	● ^v	-
Dr. J.W. Weijland	VWS/Inspectie W&V	-	-	●	-	-

¹ S = Steering group
 1 = Task group Food care
 2 = Task group Personal and sanitary hygiene
 3 = Task group Indoor environment, pets and pests
 R = Task group Cleaning and disinfection

^p project leader

^v chairman

^x person involved did not participate until the end of the project

^b Nederlandse Vereniging van Zeepfabrikanten [Dutch Society of Soap Manufacturers]