Specified Skilled Worker (i)

Manufacture of Food and Beverages Skills Proficiency Test

Textbook for Learning

4th Edition

February 2024
The Organization for Technical Skill Assessment of Foreign Workers in Food Industry

Introduction

This Manufacture of Food and Beverages Skills Proficiency Test Textbook for Learning is designed to help those who want to work in the manufacture of food and beverages (food factories, etc.) as a Specified Skilled Worker (i) learn basic knowledge and skills.

We have rearranged the structure of the textbook to make it more practical and systematic.

Based on the basic concept of food and beverage manufacturing, this textbook introduces not only the knowledge and skills required for the job, but also the basic terminology. Depending on where you work, methods, terminology, and the like may differ from this textbook. In such case, follow your workplace's approach. The basic idea is the same even if the methods and terminology are different.

Use this textbook to learn the food hygiene and labor safety knowledge and skills required for the Specified Skilled Worker (i).

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Contents

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Chapter 1: Skills Required in the Manufacture of Food and Beverages

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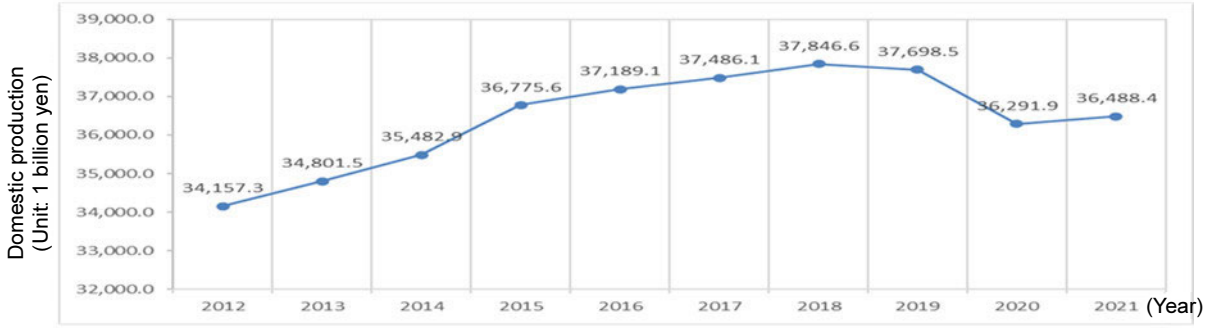
1. Various manufacturing processes of food and beverages

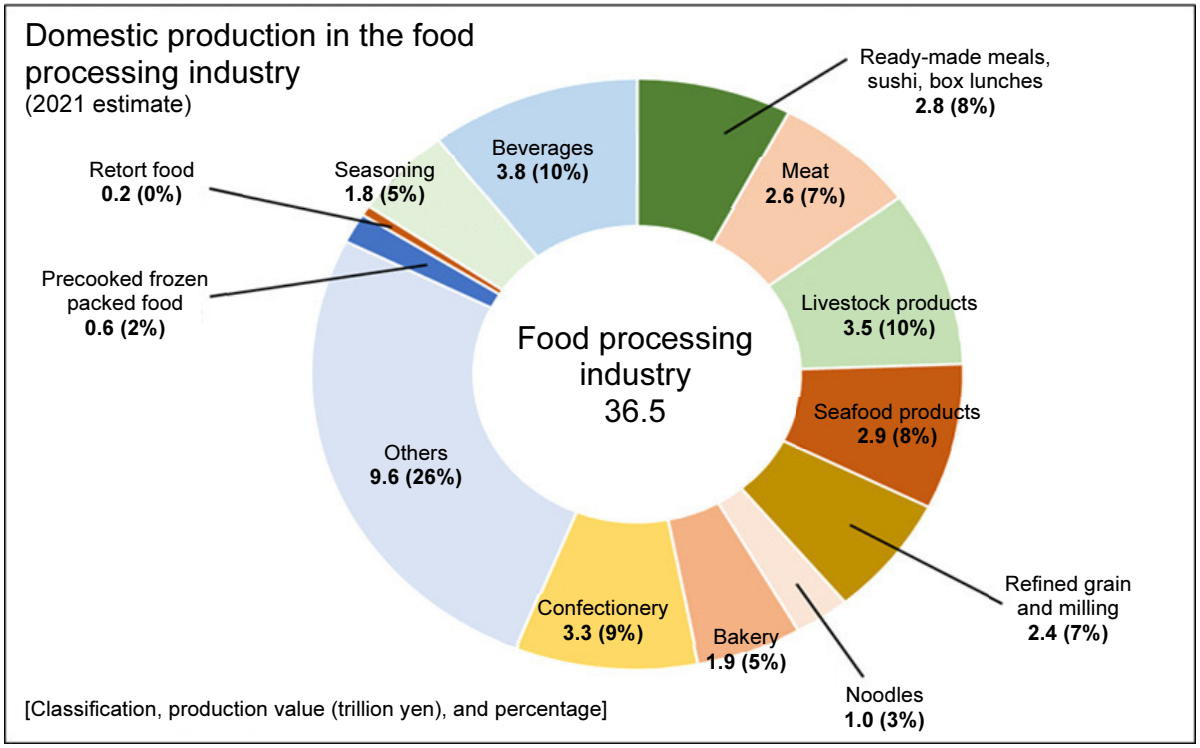
Food and beverages are essential to our lives. The manufacture of food and beverages involves the production of food and beverages at factories.

There are various manufacturing processes of food and beverages: food processing such as ham and sausage, canned fish, seasoning, bread and sweets, lunchbox, prepared foods and frozen foods, and beverage manufacturing such as juice, tea, and coffee.

According to the Ministry of Agriculture, Forestry and Fisheries statistics, the domestic production of the food processing industry in Japan has been about 37 trillion yen for the past few years.

Movements in domestic production in the food processing industry





Source: The Ministry of Agriculture, Forestry and Fisheries website, “2021 Agricultural and Food-related Industry Economic Accounts (Estimates)”

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2. Skills required for Specified Skilled Workers (i) in the Manufacture of Food and Beverages

Specified Skilled Workers (i) in the Manufacture of Food and Beverages work in the industries involving livestock products, seafood products, seasoning, bakery and confectionery products, ready-made meals, precooked frozen packed foods, and soft drinks and carbonated water. All industries require knowledge and skills in food hygiene and labor safety.

(1) Food hygiene

Hygiene is about protecting life. “Food hygiene” means that people do not get sick or injured by eating food.

“Hygiene control” in food production is to produce (control) food so that people who eat it do not get sick or injured.

If people eat food with inadequate food hygiene control (unsafe food), they will get sick or injured. The company that made the food will lose credibility.

(2) Labor safety

Industrial accidents such as injuries have occurred in food manufacturing plants.

To avoid injury in factories and workplaces, you must properly wear safety protective equipment such as work clothes and helmets.

And you must follow the rules and operating procedures set by the factory. This also applies to the use of machines and utensils.

Protecting the safety and health of workers is “labor safety.”

Operating procedures Manual

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Chapter 2: Food Hygiene

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1. Food hygiene

“Food hygiene” means that people do not get sick or injured by eating food.

The basis of food hygiene is the following actions:

- Wash your hands.
- Wear work clothes and gloves correctly.
- Use clean equipment, machines, and utensils.
- Store food and ingredients at a fixed temperature, etc.

Basic hygiene control is common in all workplaces when making any food. This is called “general hygiene control.”

For general hygiene control, the following things are important:

(1) 5S

(2) Hygiene control of facilities, equipment, and utensils

(3) Hygiene control by workers

(4) Hygiene control of ingredients and food

After carrying out general hygiene control, depending on the type of food to be produced and the characteristics of the workplace, equipment, and machines, particularly critical processes (“critical control points [CCPs]”) may be determined to carry out hygiene control.

Hygiene control that combines general hygiene control with management of the critical control points (“HACCP Plan”) is called “hygiene control by HACCP.”

HACCP refers to the Hazard Analysis and Critical Control Point. This term is also used in Japanese.

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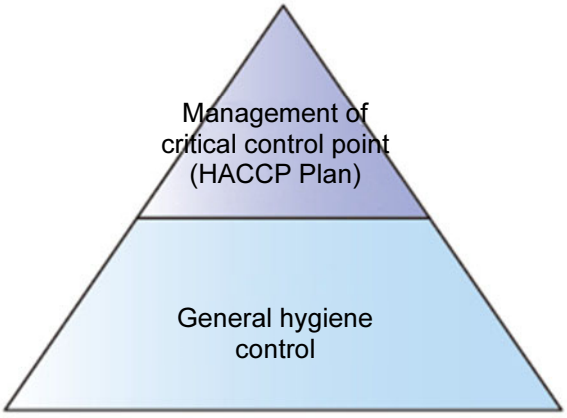

Figure: Hygiene control by HACCP

“Hazard” is a cause of illness or injury. “Hygiene control of food production,” which means making food so that people who eat it do not get sick or injured, can also mean making food so that it does not contain hazards. Both general hygiene control and the hygiene control by HACCP are activities to ensure that food does not contain hazards.

Next, we will learn about hazards, general hygiene control, and the hygiene control by HACCP.

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2. Hazard

Hazards include physical hazards, chemical hazards, and biological hazards. The hazards to be careful of in food production are explained below.

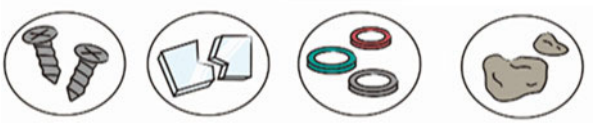
(1) Physical hazard

Among the hazards, factors that are likely to cause injury to people due to physical factors are called “physical hazards.” These result in chipped teeth due to food hardness or cuts in the mouth due to food sharpness.

The following table shows typical examples of physical hazards.

Pieces of metal, glass, plastic, etc.	They may be in ingredients or come from machines during food production.
Stone	It may be in the ingredients.

“Foreign object” is a substance that was contained in an ingredient and was not removed before production, or a substance that was not contained in an ingredient or food but entered the food during production by mistake. For example, eggshells that should have been removed but ended up in dishes such as tamagoyaki (Japanese rolled omelet) are foreign objects. Among foreign objects, those that are hard like metal pieces, glass pieces, and stones are called “hard foreign objects.”



Metal Glass Plastic Stone

To prevent physical hazards from entering the food, it is necessary to prevent contamination with hard foreign objects. For this reason, wash, sort, and prepare vegetables that may have soil or pebbles on them to remove them. Cut off the roots of vegetables and remove shells of shellfish, as well as gills and bones of fish. When storing ingredients that have been prepared in this way or foods that have been cooked, cover them with a lid.

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Foreign objects that are not hard (e.g. insects, hair, and pieces of paper) are not a physical hazard because they do not cause wounds in the mouth or throat. However, the presence of such foreign objects can lead to complaints or returns, as the food is considered unclean and unsanitary. Such non-hard foreign objects should also be kept out of the food.

When you find a hard or non-hard foreign object in the food, stop the work immediately and report it to the person in charge. Foreign objects are not only a hazard. They also discredit the company.

(2) Chemical hazard

Among the hazards, chemical substances such as allergic substances, histamine, solanine in potato sprouts, sanitizing agents, and other chemicals are called “chemical hazards.”

1) Allergic substance

“Allergic substances” are substances that cause allergic reactions and are also called allergens. “Allergic reaction” is when the body overreacts to a substance that has entered the body and causes certain symptoms. The symptoms include itching, hives, swelling of the lips or eyelids, a runny nose or sneezing, difficulty breathing, and nausea. Severe symptoms can cause death.

In Japan, by law, processed foods made from allergic substances that cause a high number of symptoms or cause severe symptoms must be labeled as containing those ingredients. Among them, “specified ingredients” are those that are required to be labeled, and “items equivalent to specified ingredients” are those that are recommended for labeling.

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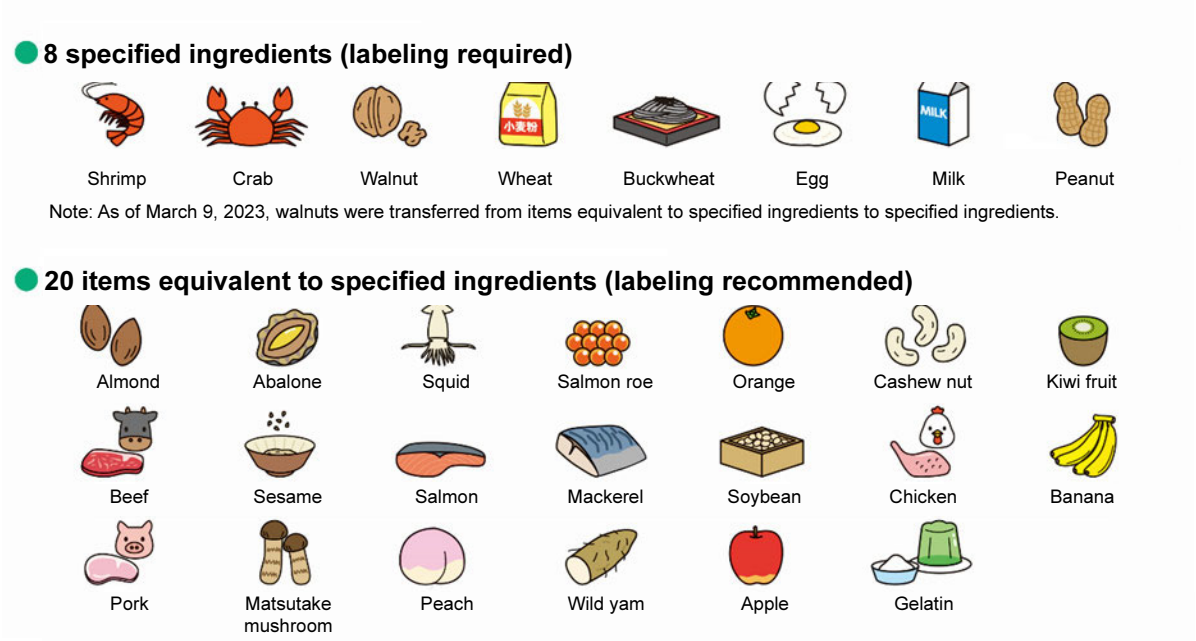

Machines and utensils used to cook ingredients containing allergic substances should not be used to cook another ingredient. This is to prevent allergic substances from entering food made with ingredients which do not contain allergic substances. Machines and utensils used to cook ingredients containing allergic substances must be washed.

It is also important to separate cooking utensils such as cutting boards and knives by ingredients. For example, use different cutting boards and knives for cutting boiled eggs and for cutting other ingredients. This is to prevent allergic substances of eggs from getting on other ingredients.

Cleaning and sanitizing agents are also chemical hazards. When cleaning or sanitizing agent is used for ingredients or cooking utensils, the agent should be washed off with water so that it does not remain on food.

2) Histamine

Fish stored in poor conditions, such as not refrigerated or frozen immediately after being caught, may contain a substance called “histamine.” Extra caution is needed for lean fish such as tuna, horse mackerel, sardines, and mackerel. Eating fish or dishes containing histamine causes allergic reactions. This is called “histamine poisoning.” As histamine increases in a poor storage environment, it is necessary to refrigerate or freeze the fish immediately after receiving it as an ingredient.

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3) Solanine

Potato sprouts and green skins contain a substance called “solanine.” Eating foods containing solanine causes symptoms of food poisoning, such as nausea, vomiting, diarrhea, abdominal pain, and headache. You can prevent them by removing potato sprouts and green skin parts.

(3) Biological hazard

Among the hazards, bacteria, viruses, parasites, and molds that cause food poisoning are called “biological hazards.”

Among biological hazards, bacteria and viruses that cause diseases are also called “pathogenic microorganisms.” Microorganisms are small creatures such as bacteria and viruses that cannot be seen without a microscope.

1) Bacteria (food poisoning bacteria)

Among pathogenic microorganisms, bacteria that cause food poisoning are called “food poisoning bacteria.”

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○ Typical food poisoning bacteria and their symptoms

Name of food poisoning bacteria	Feature	Food likely to cause	Main symptoms
Campylobacter spp.	Increases in the body and causes illness.	Meat (especially chicken)	Diarrhea, abdominal pain, fever
Salmonella spp.	Increases in the body and causes illness.	Eggs and meat (especially chicken)	Diarrhea, abdominal pain, fever
Vibrio parahaemolyticus	Increases in the body and makes toxins.	Seafood	Abdominal pain, severe diarrhea
Enterohemorrhagic E. coli (O157, O111, etc.)	Increases in the body and causes illness. Some produce toxins.	Meat (especially beef), vegetables, well water	Abdominal pain, severe diarrhea, bloody stool
Staphylococcus aureus	Exists in a person's skin or wound. Increases in food and makes heat-resistant toxins.	Rice balls, sandwiches, etc.	Nausea, vomiting, abdominal pain
Bacillus cereus	Produces heat-resistant spores (*). Increases in the body and food and makes toxins.	Processed grains, fried rice, etc.	Nausea, vomiting, abdominal pain, diarrhea
Clostridium perfringens	Produces heat-resistant spores. Increases in food, and makes toxins in the body.	Earthy ingredients, water, cooked foods (curries, stews, etc.)	Abdominal pain, diarrhea
Clostridium botulinum	Produces heat-resistant spores. Increases in food and makes toxins.	Bottled foods, retort foods, etc.	Nausea, vomiting, dyspnea

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(*) Spore

A spore is like a shelled bacterial species. Normal bacteria die when heated, but some survive by producing spores when heat or dryness make it difficult for bacteria to grow. When the bacteria return to the environment where they grow easily, they start to revert from spores back to normal bacteria.

The following three principles of food poisoning prevention are important to prevent bacterial food poisoning.

a) Do not contact microbes

b) Do not allow microbes to multiply

c) Kill microbes

a) Do not contact microbes

This means avoiding putting food poisoning bacteria on clean food and ingredients. To do this, wash hands as specified before starting work or when necessary. Also, wash and sterilize machines and cooking utensils.

b) Do not allow microbes to multiply

This means not increasing food poisoning bacteria in food. Bacteria need high temperatures, high humidity, and nutrients to grow. Many bacteria prefer high temperatures (20°C to 50°C) and high humidity (or moisture). Especially at 30°C to 40°C, they increase rapidly. However, they increase slowly below 10°C, and hardly increase below 4°C. They do not increase below -15°C. It is important to store food at a low temperature in order not to increase food poisoning bacteria in food.

Some food poisoning bacteria make toxins. These toxins can also cause food poisoning. Some toxins produced by Staphylococcus aureus, Bacillus cereus, and others cannot be destroyed even when heated. Therefore, for these food poisoning bacteria, it is especially important not to let them increase or make toxins.

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c) Kill microbes

This means killing food poisoning bacteria in ingredients and food. When sterilizing by heating, it is important to heat for a specified time at a specified temperature. Many food poisoning bacteria can be killed by heating at 75°C for at least 1 minute, but more stringent conditions may be needed to kill the spores. When sterilizing with chemicals, it is important to sterilize the whole food for a specified time with a specified concentration of agent.

Some spores may not be destroyed (killed) by cooking alone, and Bacillus cereus and Clostridium perfringens may increase as the temperature slowly decreases after cooking. For this reason, it is important to cool the cooked food immediately.

2) Virus

A typical virus that causes food poisoning is norovirus. Bivalves such as oysters may be contaminated with norovirus. Norovirus does not increase in food, but it increases in the infected person's body (intestine), causing symptoms such as abdominal pain, diarrhea, and vomiting. Norovirus is in human feces and vomit.

The basic measure to prevent food from being contaminated with norovirus is to wash hands thoroughly. Especially, washing hands after going to the bathroom is important.

To kill norovirus by heating, ingredients and food must be heated at least 90 seconds after their center temperature reaches 85°C to 90°C.

Alcohol disinfectant cannot kill norovirus. The machines and utensils used to cook should be washed and soaked in a sodium hypochlorite solution with a concentration of 200 ppm (parts per million) or wiped with a cloth soaked in a sodium hypochlorite solution.

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(*) Four principles of food poisoning prevention caused by norovirus

Norovirus does not increase in food. For this reason, “do not allow microbes to multiply” among the three principles of food poisoning prevention is not effective.

To prevent food poisoning caused by norovirus, it is important “not to bring” norovirus into food manufacturing plants. Before entering a food manufacturing plant, workers should make sure they are not infected with norovirus, and wash their hands thoroughly.

When a worker is infected with norovirus, it is important to thoroughly disinfect the inside of a food manufacturing plant. Vomit should be handled correctly using specialized equipment. This is called “not to spread.”

To prevent food poisoning caused by norovirus, the following four principles are important: 1) Do not bring it, 2) Do not contact it, 3) Kill it, and 4) Do not spread it.

3) Mold

Mold is a microorganism, but it can grow and become visible. Mold spores are everywhere and cannot be fully eliminated. Beans, grains, vegetables, and fruits are foods that tend to increase mold during storage. Don’t use moldy food.

4) Parasite

Parasites live on the surface and inside the bodies of people and animals by taking nutrients from people and animals. For example, there is a parasite called Anisakis. Anisakis infests fish and shellfish such as mackerel, sardines, salmon, horse mackerel, and squid. Eating raw seafood with Anisakis causes a severe stomachache. This is called “Anisakis food poisoning.” Anisakis can be killed by heating above 70°C or for 1 minute at 60°C. It can also be killed by freezing at -20°C for more than 24 hours.

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3. General hygiene control

“General hygiene control” refers to hygiene control that is common in all workplaces when making any food.

It can be divided into three categories: hygiene control of facilities, equipment, and utensils; hygiene control by workers; and hygiene control of ingredients and food. What all three have in common is the 5S concept.

This section explains (1) 5S, (2) hygiene control of facilities, equipment, and utensils, (3) hygiene control by workers, and (4) hygiene control of ingredients and food.

(1) 5S

The term “5S” refers to five activities (*) beginning with the letter S.

(*) Sorting, Setting-in-order, Shining, Standardizing, and Sustaining/Self-discipline

1) Sorting: Remove what you do not use and keep only what you use. Eliminate unnecessary utensils and tools and leave only necessary ones.
2) Setting-in-order: Make utensils and tools readily available when needed. To do this, place them in a specific location, arrange them in a convenient order, and display their names and quantities.
3) Shining: Clean equipment, utensils, and tools by washing, polishing, or wiping them. Also, remove dirt.
4) Standardizing: The workplace looks good and has no problems with food hygiene through sorting, setting-in-order, and shining. Equipment and utensils are not contaminated with pathogenic microorganisms.
5) Sustaining/Self-discipline: Be able to do what is decided as decided. Be able to follow the rules of sorting, setting-in-order, shining, and standardizing.

General hygiene control is based on the 5S concept, such as keeping facilities, equipment, and utensils clean, preventing the introduction of pathogenic microorganisms from workers’ fingers and work clothes, preventing the introduction of pathogenic microorganisms into ingredients and food, and removing hard foreign objects.

The 5S concept is useful not only for food hygiene but also for labor safety, which prevents you from getting sick or injured in the workplace. It is carried out in various factories and workplaces in Japan and around the world.

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(2) Hygiene control of facilities, equipment, and utensils

Ensure that facilities, equipment, and utensils are properly managed to prevent hazards from entering food by keeping metal fragments or chemicals out of food, and by not allowing pathogenic microorganisms to contact or multiply in food.

Clean people or objects (ingredients, food, machines, utensils, etc.) can become contaminated with hazards if they come in contact with people or objects that are not clean. This is called “cross-contamination.” To prevent cross-contamination, it is important to properly use facilities, equipment, and utensils for their intended purpose, and to keep them clean.

1) Different uses of facilities and equipment (zoning)

To prevent cross-contamination, food manufacturing plants are usually divided into clean, semi-clean, and contaminated work areas. This hygiene control by dividing areas is called “zoning.”

In a clean work area, foods that have been sterilized by heating or chemicals are handled. For example, in ready-made meal manufacturing, topping, serving, packaging, and other work are done in this area.

In a semi-clean work area, ingredients before sterilization are handled. Preparation, cooking, etc., are carried out. Foods that are being prepared or cooked must not come into contact with ingredients before work in this area.

In a contaminated work area, ingredients which brought in from outside the workplace are received and handled. Products packed in cardboard boxes for shipping are also handled here.

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- People working in contaminated work areas must not enter semi-clean or clean work areas. Ensure that ingredients from contaminated or semi-clean work areas do not pass through clean work areas.
- Ingredients must not be brought into semi-clean or clean work areas in cardboard boxes or containers. The cardboard boxes and containers may be contaminated with dirt, dust, insects, and microorganisms.
- When you take out unnecessary ingredients or garbage from the workplace, take it out by a designated route. Some food manufacturing plants decide the time to use the passage to take out garbage. After using the passage, clean, wash, and disinfect it to prevent cross-contamination.

2) Cleaning, washing, and disinfection

Facilities and equipment must be cleaned regularly and always kept clean.

If not cleaned, insects and mice may enter and increase in the workplace, resulting in a poor sanitary condition of facilities and equipment.

Extra caution is needed for drains and places under large machines, where insects tend to infest. Remove covers and wash drains. The floor of the workplace should not be left wet, because microorganisms increase.

Wash machines such as mixing machines (mixers) and cutting machines (slicers and choppers) every time after changing ingredients. Make sure to wash them when the work is finished as well. If possible, disassemble and wash the parts. Machines should be washed every day even if they do not seem dirty.

After washing them thoroughly in this way, parts that directly touch food such as blades should be sanitized.

If the utensils used for work (kitchen knife, cutting board, etc.) have dirt left, microorganisms will grow there. Moisture on the utensils can also cause microorganisms to grow. After using utensils, wash them in a prescribed way and dry them so that no moisture remains before storing them.

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If cleaning tools such as scrubbers, sponges, mops, wiping cloths, squeegees, and deck scrub brushes are left dirty or wet, microorganisms may develop.

3) Management of chemicals

When chemicals are mixed into food, people who eat the food may get sick. Also, if the chemical gets into the eyes or on the skin of the person who manufactures the food, the person may become blind or get burned.

Chemicals must be stored correctly in a designated area. Sanitizing and washing agents and other chemicals should not be stored in the same storage as ingredients. Also, they should be labeled with their names so that they can be easily distinguished. If you find a chemical without a label, you must report it to the person in charge immediately.

(3) Hygiene control by workers

Workers should not bring into the workplace anything that causes foreign object contamination or pathogenic microorganisms that cause food poisoning. In addition, cross-contamination (see “(2) Hygiene control of facilities, equipment, and utensils”) from work clothes and workers’ fingers must be prevented. The hygiene control necessary for this purpose is explained below.

1) Health check

Before starting work, make sure that workers have no symptoms such as diarrhea, fever, and nausea, or scratches on the fingers. This is called “health check.” Anyone who has these symptoms must report it to the person in charge. Even though you did not have any symptoms when you started work, you may get a stomachache or cut your fingers later. You should not continue working in such case. Stop the work immediately and report it to the person in charge.

Workers must undergo regular medical checkups and stool examinations as decided at the workplace.

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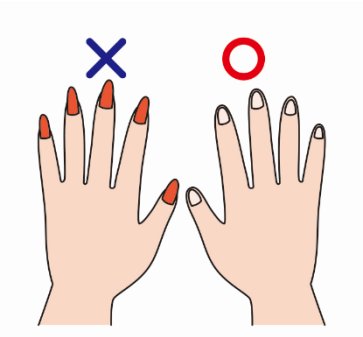
2) Work clothes

a) Wearing work clothes

To avoid bringing dirt and foreign objects into the workplace, and to avoid putting microorganisms on ingredients, machines, and utensils, the following points must be followed to properly wear work clothes.

- Wear work clothes in a changing room.
- All work clothes, a face mask, a hair net, a hat, shoes, and gloves must be clean and fit your size.
- Always cut your nails short. Don't enter the workplace with fake nails or nail polish.
- Don't enter the workplace wearing rings, bracelets, watches, accessories (e.g. necklaces and earrings), hairpins, false eyelashes, etc.
- Don't bring anything into the workplace that is not necessary for the work.



Check in a mirror that you are wearing the work clothes correctly. For example, make sure that the clothes you are wearing under your work clothes are not visible, the face mask is covering your nose, and your ears and hair are not coming out of the hat or hair net.

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Generally, put on work clothes in the following order:

i) Brushing

Brush your hair well.

ii) Hair net

Wear a hair net.
Put all your hair in.

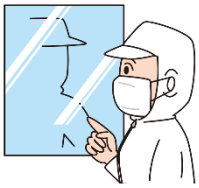
iii) Hat

Put on a hat.

iv) Work clothes

Put on work clothes.
Fasten buttons and zippers properly.

v) Check



Finally, check if you are wearing the clothes properly.

Work clothes must always be worn correctly during work. For example, you should not take off your hat just because the workplace is hot. Don’t roll up the sleeves of your work clothes. Don’t take off your face mask either.

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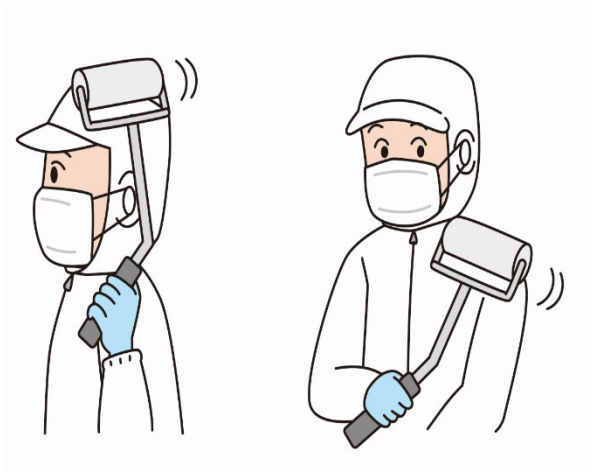
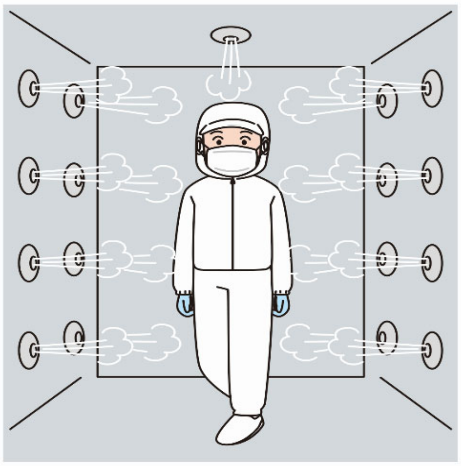
Before entering the workplace, remove hair and dust from work clothes with an adhesive roller or air shower.

Adhesive roller



Air shower



b) Zoning and work clothes

Don’t leave the workplace with your work clothes, hat, or shoes. If you go back to the workplace, you end up bringing dirt, dust, insects, and microorganisms on your work clothes, hat, and shoes into the workplace.

You must change into toilet footwear in a bathroom.

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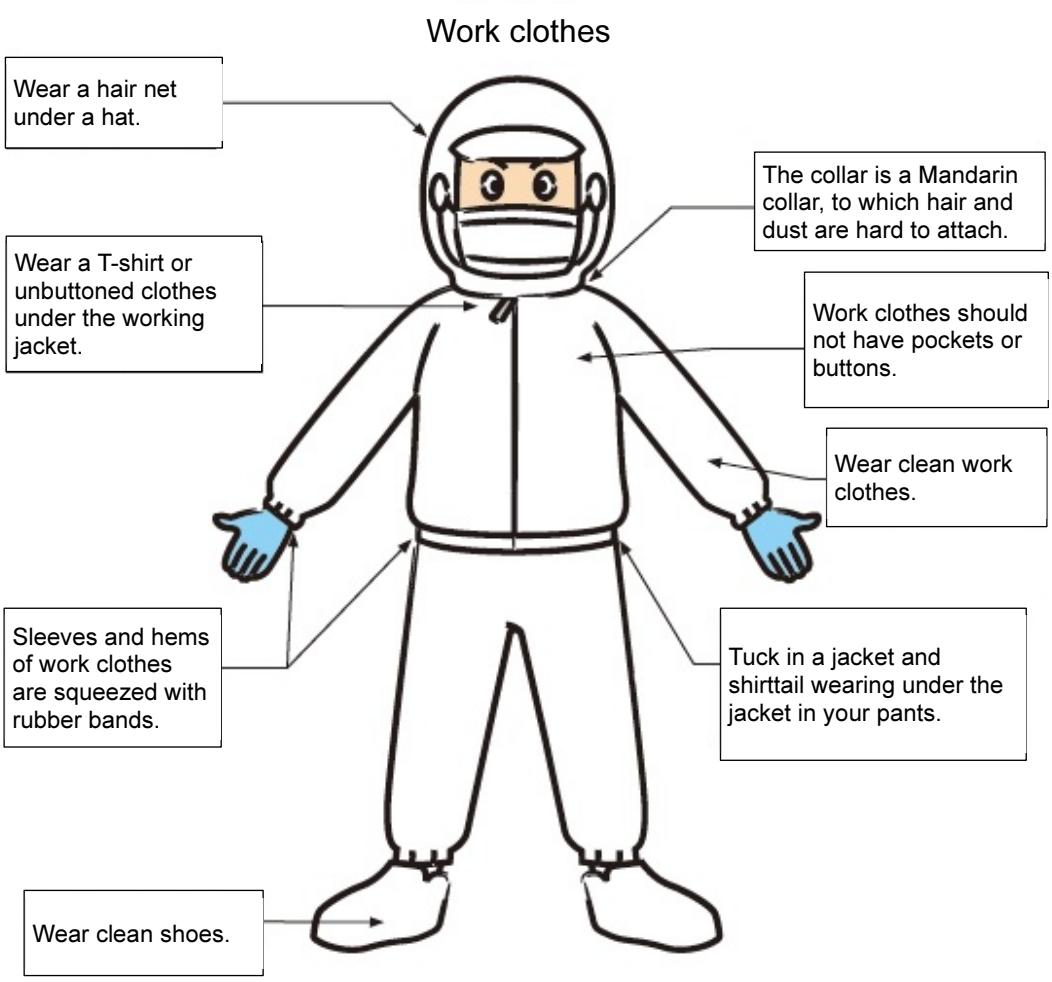
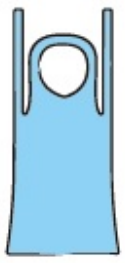
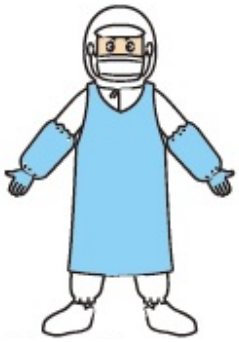
Work clothes





Apron

Arm covers



With an apron and arm covers over work clothes

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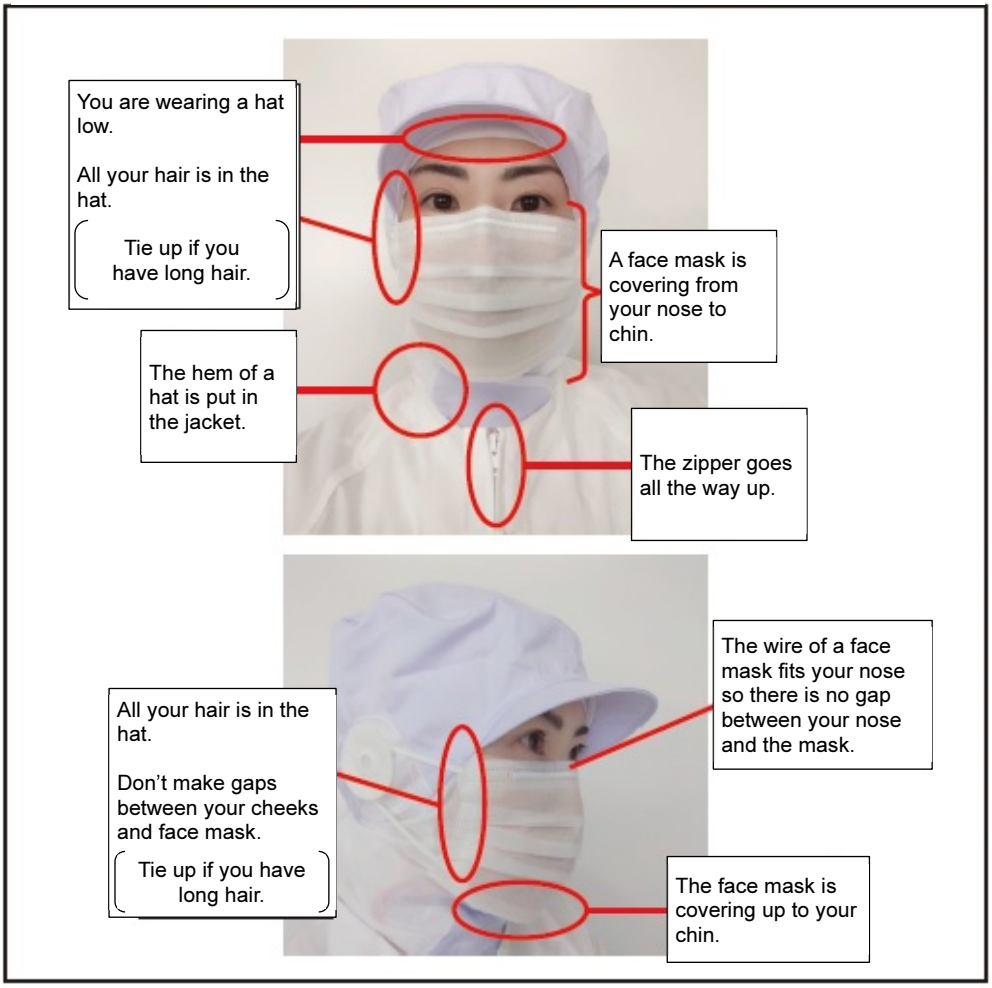
Precautions for properly wearing work clothes, hats, and face masks



Precautions for properly wearing gloves

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3) Hand washing

Wash hands to avoid contaminating ingredients and food with microorganisms on your fingers. Hands should be washed in the following cases:

- Before entering the workplace
- Just before starting work in the workplace
- After going to the bathroom
- When touching food or utensils after touching raw meat, fish, eggs, etc.
- Before directly touching food, such as for serving
- When moving from a contaminated work area to a non-contaminated work area

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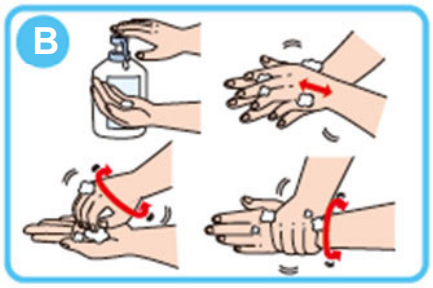
Proper hand-washing method

A. Clean hands well with running water.

B. Soap hands, fingers, and wrists. Especially, wash the area between the fingers, and the tips of the fingers and nails.
(About 30 seconds)



C. Rinse the soap well with running water.
(About 20 seconds)

D. Dry your hands with a disposable paper towel or a hand dryer.

E. Spray rubbing alcohol on both hands and rub it into them.

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4) Wearing and replacing gloves and aprons

Gloves and aprons are used in food production work to prevent workers from exposing ingredients and food to hazards. Disposable gloves and aprons are often used to ensure thorough hygiene control.

Wash hands before wearing gloves.

Gloves should be replaced to avoid contamination of ingredients and food in the following cases:

- When you change ingredients to be handled, such as when cooking vegetables after meat or fish. This is to prevent hazards (pathogenic microorganisms and allergic substances) of the ingredients handled earlier from being applied to the next ingredients.
- When you start food production work after touching a cardboard box or container to receive ingredients
- When you enter the workplace after going to the bathroom or taking a break
- When you touch sterilized ingredients (cooked or uncooked)
- When the gloves you were wearing are torn
- When you start serving food after another food

5) What workers must observe

- Before the work, read the operating procedures and confirm where and what work you should do. Check the machines, equipment, and utensils to be used for dirt and defects.
- Don’t eat or drink anything in the workplace. Don’t smoke. Don’t spit. Don’t blow your nose or cough near food.
- Don’t work with hands that have touched your hair, eyes, nose, or around your mouth. If you do, wash your hands again or change your gloves.
- Don’t wipe your hands on your work clothes.
- Don’t bring any non-work-related belongings (watches, smartphones, wallets, photos, cigarettes, etc.) into the workplace.
- Don’t bring paper with staples or clips, pencils, or mechanical pencils into the workplace. This is because staples, clips, broken pencils, and mechanical pencil lead can cause foreign object contamination.

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An odor itself is not a hazard, but it has a bad effect on the quality of food. For this reason, you should not bring anything that smells strong, such as perfume, into the workplace. Some food manufacturing plants even prohibit workers from using perfume, because they may not notice that the quality of ingredients or food has deteriorated if they wear perfume.

Some food manufacturing plants adopt work clothes without pockets. This is to prevent workers from intentionally bringing items into the workplace that are not used in the work. To make sure that the work is done correctly, some plants record the comings and goings of the workers or place cameras in the doorway or warehouse of the workplace.

(4) Hygiene control of ingredients and food

To produce safe and quality food, it is important to use safe and quality ingredients and to control the manufacturing method properly.

1) Acceptance and storage of ingredients

a) Acceptance of ingredients

When accepting ingredients from outside, check the ingredients you received against the order form to make sure the contents are delivered correctly. This is called “acceptance inspection.”

Check the appearance and smell of ingredients, standards (size and number of ingredients), packaging conditions, labeling of expiration date and storage method, product temperature, etc. Don’t accept items that are spoiled, have broken packaging, have expired, or are not properly stored. In such case, report it to the person in charge and return or exchange the item.

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For the ingredients subject to acceptance inspection, they are accepted after confirming that they have passed the inspection.

When accepting ingredients that need to be refrigerated or frozen, avoid leaving them at room temperature for long periods of time.

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b) Storage of ingredients

Storage of ingredients depends on the type of ingredients. Each ingredient must be stored at a specified temperature. Storage temperatures of the main ingredients are as follows:

Type of ingredient	Temperature
Rice	15°C or less
Processed grains (wheat flour, starch)	Room temperature (Note 1)
Seasoning (sugar, salt, miso, soy sauce and other sauce, vinegar)	Room temperature
Meat	10°C or less
Meat products (ham, sausage, bacon)	10°C or less
Frozen meat	-15°C or less
Frozen meat products	-15°C or less
Boiled octopus	10°C or less
Fresh seafood	5°C or less
Frozen fish	-18°C or less
Frozen food	-18°C or less
Liquid fats	Room temperature
Solid fats (lard, margarine, shortening)	10°C or less
Eggs in the shell	10°C or less
Liquid eggs	8°C or less
Frozen eggs	-18°C or less
Fresh fruits and vegetables (Note 2)	Around 10°C
Milk, concentrated milk, skim milk, cream	10°C or less
Butter, cheese, condensed milk	15°C or less

(Note 1) Store in a dry place at room temperature.

(Note 2) Storage temperature may be specified for some pre-cut vegetables in containers.

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Don’t fill a refrigerator with ingredients. Without gaps, cold air cannot circulate throughout the refrigerator to cool the ingredients sufficiently. In the case of a freezer, it is better to fill 80 to 90% of the freezer with frozen foods so that they can cool each other and save electricity. Don’t leave the refrigerator or freezer door open, because it will not keep the temperature low.

Periodically measure the temperature in the refrigerator and freezer to make sure the right temperature is kept every day, and record the results.

The Food Sanitation Act stipulates that freezers be set at -15°C or less and refrigerators at 10°C or less.

Keep the inside clean by regularly cleaning shelves and floors in the refrigerator and freezer.

c) Use-by date, best-before date, and expiration date

“Use-by date” is the last day of the period when ingredients are allowed to be used. Don’t use ingredients that have passed their use-by date. Each ingredient has a different use-by date. The food manufacturing plant that uses the ingredient decides the use-by date.

If the ingredient is processed food in a container or bag, the best-before date or expiration date is indicated on the container or bag. The company that manufactured the processed food (ingredient) indicates both dates.

“Best-before date” is the last day of the period when unopened processed food can be eaten deliciously if stored under specified conditions. You can eat food that has passed the date, but food manufacturing plants generally do not use food (ingredients) that have passed their best-before date.

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“Expiration date” is the last day of the period when unopened processed food can be eaten or used if stored under specified conditions. Food (ingredients) that have passed the expiration date are more likely to cause food poisoning, so never use them.

Ingredients delivered (received) first are used first. This is called “first-in, first-out.” Generally, the best-before date or the expiration date comes first for the item delivered (received) first.

2) Opening and preparation of ingredients

a) Opening

When you open packages, take care not to accidentally allow the packaging materials to enter into the product, such as cardboard boxes, kraft and other paper, plastic baskets containing vegetables, and plastic bags containing frozen meat.

(*) To prevent scraps of opened bags and containers from entering into food

- Don’t cut the same place more than once.
- Make sure that the cut ends are aligned with the cut ends.
- Check that the number of opened bags and containers and the number of scraps are the same.

b) Preparation

○ Thawing and heating

Frozen ingredients can be thawed at room temperature (“room temperature thawing”), in a refrigerator (“refrigerator thawing”), or with tap water (“running water thawing”).

When thawing, the meat or fish is placed in a tray to prevent the juice (“purge”) from contacting other food or ingredients. It may be placed on a mesh tray and placed in a thawing rack to allow the purge to flow directly into a drain.

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When thawing under running water, before thawing, make sure there are no holes or tears in the airtight bag that holds the ingredient. If there are holes or tears in the bag, some of the ingredients will flow out with the running water. If you find holes or tears, transfer the ingredient to another airtight bag before thawing.

Solid fats and food pastes are easier to take out from the container when heated and softened. Careful control is required when heating ingredients, as overheating can deteriorate their quality.

○ Washing

Many ingredients are washed with water to remove foreign objects and dirt. In the case of seafood and algae, they may be washed with a salt solution of appropriate concentration. Ingredients such as vegetable salads that do not have a heating process are sterilized using chemicals.

○ Selecting, sorting, and cutting

Ingredients that have dirt, a different color, texture, or smell as well as the parts such as vegetable roots, sprouts, skins, fish scales, and fins are not used. These should be removed and disposed of to prevent them from being used in food production.

For raw meat, the X-ray foreign object detector may be used to check whether there are any bones left in the meat. Remove any bone if found.

3) Hygiene control of manufacturing process

a) Washing manufacturing equipment

Equipment used for food production, such as shredding, mixing, heating, and molding, must be washed and cleaned. If water remains in the production facility or in the piping that leads to the production facility, the water may be contaminated with microorganisms. Therefore, wash the production facility again or flush the remaining water from the piping with hot or cold water.

When food containing allergic substances is manufactured, the equipment used is carefully washed so that no allergic substances remain in the equipment. Food containing allergic substances may be produced at the end of the day and then carefully washed.

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b) Heat sterilization

Heating can make ingredients easier to eat and digest, and more delicious. In addition, proper heating can eliminate the biological hazards (such as pathogenic microorganisms) contained in the ingredient. This is called “heat sterilization.”

Some microorganisms among bacteria, such as spore-forming bacteria (*), are heat resistant and do not die even above 100°C. Therefore, when killing microorganisms by heating, the temperature and time of heating must be set appropriately.

(*) Bacteria that produce spores, such as Bacillus cereus, Clostridium perfringens, and Clostridium botulinum

Example of heating temperature and time to kill microorganisms

Spore-forming bacteria such as Bacillus cereus	Center temperature 120°C	4 minutes or more
Norovirus	Center temperature 85°C to 90°C	90 seconds or more
Common food poisoning bacteria	Center temperature 75°C	1 minute or more

Heat sterilization must be controlled at the center temperature of the ingredient. When heating large ingredients such as block meats, the center temperature should always be checked.

c) Cooling after heat sterilization

Many pathogenic microorganisms can be killed by heat sterilization. However, you cannot kill them all at once, because some of them will survive even after heated. Some will increase in the food while the heated food cools slowly, and cause food poisoning. For this reason, it is important to cool the cooked food immediately.

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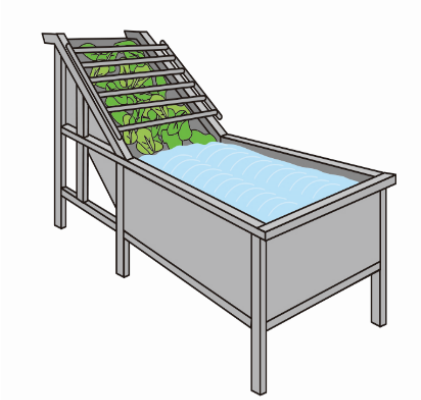
Specifically, the center temperature must be reduced to 20°C within 30 minutes or to 10°C within 60 minutes after heating.

There are two cooling methods: air (“air cooling”) and cold water (“water cooling”).

It is also important to cool the finished food immediately so that the taste is not spoiled.

d) Chemical sterilization



Chemicals may be used to kill pathogenic microorganisms in unheated foods. This is called “chemical sterilization.” Chemical concentration and treatment time are key.

Specifically, the food is soaked in a sodium hypochlorite solution with a concentration of 200 ppm for 5 minutes, or 100 ppm for 10 minutes.

e) Freezing

Fresh and processed foods are cooled and frozen to improve their shelf life. Freezers are used to freeze food and store frozen food.

If food is frozen slowly, the texture and flavor such as hardness and chewiness will deteriorate. For this reason, it is necessary to freeze food quickly in a short period of time in order to freeze food deliciously.

4) Filling, packaging, and inspection

Food that has sufficiently reduced hazards through sorting and sterilization are filled or packaged in clean containers. This is to prevent hazards from coming in from outside. Containers and packaging materials used for filling and packaging, such as bottles, caps, and bags, must be clean. Especially, don’t touch the mouth of the bottle, the cap, or the inside of the bag.

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The best-before and expiration dates are correctly printed on the containers and packaging of processed foods to be shipped.

Many mistakes have been made, such as wrong best-before date or expiration date. Different people should check that the settings of the printing machine are correct and that the printed dates are correct.

After filling or packaging, the container or package may be inspected to make sure if there are small holes that allows air to leak in or out, or contents to leak out.

a) Metal detector

If there is a possibility of metal contamination in food, a metal detector may be used for inspection. This is because it can find metal among hard foreign objects.

Image credit: Ishida Co., Ltd.

The important thing in managing a metal detector is to use a test piece to make sure that the metal is detected correctly before you start checking for contamination with foreign objects. When production is finished, use the test piece again to verify that the metal detector was functioning properly until the end. The size of the test piece is determined by each food manufacturing plant.

If the metal detector does not function properly, you must report it to the person in charge immediately. This is because any food that has been made from the time you made sure the metal detector was working correctly to the time it is not working right might have metal in it.

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b) X-ray foreign object detector

An X-ray foreign object detector can detect hard foreign objects such as stone and glass that cannot be found by metal detectors. It is sometimes used to control the receipt of ingredients and to check for insufficient quantity of products or defective shapes.

Plastic is hard to find by X-rays, so instead of relying on X-ray foreign object detectors, you must make sure that plastic does not get into food from machines and equipment.

Image credit: Ishida Co., Ltd.

c) Microbiological examination

Foods that are obligated by law for microbiological examination are tested for the specified items in a specified way. In a voluntary microbiological examination conducted by a food manufacturer, the general viable count, Escherichia coli, and coliform bacteria are generally tested. Staphylococcus aureus, Salmonella spp., and Campylobacter spp. may also be tested.

5) Storage, Shipping, and Delivery

Food that passed the inspection is stored in the product warehouse until shipment. Storage temperature and other conditions are determined for each food.

a) Storage of product samples

If you receive a complaint about a product that has been shipped, you need to find out if there is a similar problem with the products that were manufactured during the same period. To do this, a certain percentage of products are extracted and stored as samples.

b) Shipping and delivery

Foods stored in the product warehouse first are shipped first. This is also “first-in, first-out.” (See “(1) Acceptance and storing ingredients.”)

They are transported at a temperature determined for each food so that the quality does not deteriorate during transportation.

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4. Hygiene control by HACCP

Some foods cannot be manufactured free of hazards by general hygiene control alone. Such foods require not only general hygiene control but also a special system to ensure that they do not have their hazards.

1) Examine food ingredients and manufacturing processes to analyze what hazards exist and how they can be controlled to make food hazard free (“hazard analysis”).
2) The most critical process (“critical control point [CCP]”) and the criteria for managing the process (“management standard”) are determined.
3) Monitor that general hygiene control is performed and the critical control point is controlled properly. If they are not conducted correctly, the food will not be shipped.

In this way, ensure that foods are produced with no hazards. This system is called “hygiene control by HACCP.”

Some foods have more than one critical control point.

(1) Seven principles of HACCP

HACCP operates according to the following seven principles of HACCP:

Principle 1: Hazard analysis

Analyze the hazards to determine what controls are required to ensure that the food to be produced does not contain a hazard.

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Principle 2: Determining critical control point

As a result of Principle 1, if general hygiene control alone is not sufficient to produce food that does not contain a hazard, a critical control point should be determined to eliminate the hazard.

Principle 3: Setting management standard

Determine the management standard for the critical control point.

Principle 4: Configuring monitoring methods

Determine how to monitor the management status of the critical control point.

Principle 5: Establishing remedial actions

In case a critical control point deviates from the management standard, decide actions to be taken to meet the standard and handling of the food that has been made.

Principle 6: Configuring validation methods

Confirm that the measures determined in Principle 5 are effective in eliminating and reducing hazards.

In addition, determine how to confirm that the measures determined in Principle 5 has been implemented as planned.

Principle 7: Recording

Record the contents of Principles 1 through 6 in writing. Also, record the results of actual confirmation using the method determined in Principle 6.

(2) Critical control point and management standard

Many foods need to be managed with critical control points. The points depend on the food. For example, in the case of ready-made meals, the points of processes differ depending on whether the food is cooked or uncooked.

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Management standards must be observed for critical control points.

The following five processes are typical critical control points in food production. Specifically, see “Section 3. General hygiene control” in this chapter.

1) Heat sterilization
2) Cooling after heat sterilization
3) Chemical sterilization
4) Metal detector
5) X-ray foreign object detector

(3) Deviation from management standard

“Deviation from management standard” is defined as cases where the specified management standard is not actually observed, such as cases where the food is determined to be heated for 1 minute or more after the center temperature reached 75°C, but actually the temperature reached only 70°C, or cases where the food is determined to be soaked in 100 ppm sterilization solution for 10 minutes for sterilization, but actually soaked for only 5 minutes.

If you notice that a critical control point has deviated from the management standard, you must report it to the person in charge immediately.

In that case, you should take the following remedial actions to ensure that no hazards remain in the food. Follow the instructions of the person in charge when taking remedial actions.

(4) Remedial action

Make sure that the critical control point will not be deviated from the same management standard again. Also, decide handling of the food that has already been made (disposal, remanufacturing, or other actions). These two necessary measures are called “remedial actions.”

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For example:

If the speed of the conveyor through the heating zone was too fast and the center temperature of the food was not high enough, adjusting the speed of the conveyor to slow down and discarding the underheated items are considered remedial actions.

If the metal detector was not functioning properly, adjusting the machine to function properly and then inspecting the food again are remedial actions.

(5) Recording

It is necessary to keep records of how HACCP was implemented, such as the management records of the critical control points implemented, and the remedial actions taken when deviating from the management standards. Records can verify that the food was produced with appropriate control measures to eliminate hazards.

In both general hygiene control and critical control points, procedures for when, by whom, and how to record must be determined in advance.

For example, decide when, by whom, and how to record the temperature in the refrigerator, the center temperature of heated hamburger steaks, and the concentration of the sterilization solution used.

You must record the temperature, concentration, and time as soon as you measure or check it. Don’t record all at once later. Don’t record the results before measuring just because they are always the same. Don’t record without checking.

Never record something that is not true. Don’t correct the results by your judgment.

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Chapter 3: Labor Safety

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1. Industrial accidents in the manufacture of food and beverages

(1) Relationship between experience and industrial accidents

Among all manufacturing industries, the highest number of unskilled workers (those with less than three years of experience) are killed or injured in the food processing industry. In the workplace of manufacture of food and beverages, it is important to work carefully so that industrial accidents do not occur.

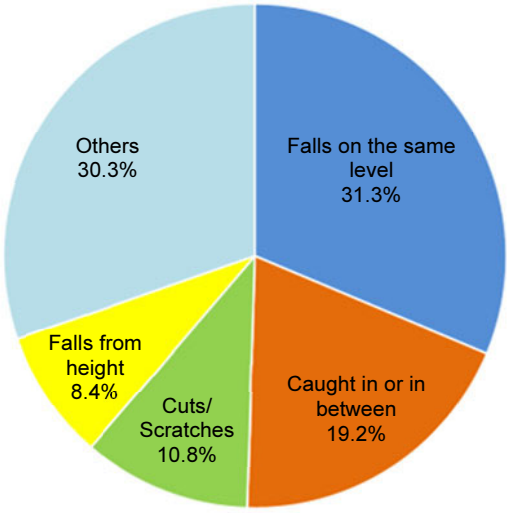
Unskilled workers account for about half of all industrial accidents in the food processing industry. There are many dangers in the workplace, but especially those who have little experience and are not used to working can hardly notice them. Therefore, unskilled workers tend to suffer more industrial accidents than those who have worked long in the industry.

(See “For Work Safety and Health: To those working in the manufacturing industry” by Japan Association of Safety and Health Consultants.)

In food manufacturing plants, the most common types of industrial accidents are: 1) falls on the same level, 2) caught in or in between, and 3) cuts and scratches. These three accounts for about 60% of all industrial accidents.

(See pie chart at right.)

Occurrence of injuries and deaths caused by type of accident within the food processing industry (2022)



(Source: The Ministry of Health, Labour and Welfare website, “Occurrence of injuries and deaths caused by type of accident by industry (2022)”)

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(2) Major industrial accidents

1) “Falls” accident

It happens when workers run and slip, trip on things, or cannot walk straight with packages. As a result, they hit their head or back, or break their hand when landing on the hand.

2) “Caught in or in between” accident

It happens when workers put their hand in a machine or when they are cleaning conveyor gears, etc. As a result, it can lead to finger fractures, or in the case of a large machine, serious accidents such as broken arms or death because the body is caught in the machine.

3) “Cuts/Scratches” accident

It happens when workers use a knife, a chopper, and other cutting machines, or when they put their hand into the machine because the ingredients are stuck in. They may cut their hand or cut off their finger.

4) “Falling” accident

It happens when workers are walking downstairs or working at a high place using a ladder or stepladder. They may sprain their foot, hit their body, or break their hand when landing on the hand.

5) “Burn” accident

It happens when workers are using a machine such as an oven, or when they are handling hot water or food. They may burn their hands and feet as well as face and whole body.

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6) “Lower back pain” accident

It happens when workers lift heavy things or carry heavy things repeatedly. In the case of back pain, it may take time to heal, or the same accident may occur repeatedly.

7) “Heatstroke” accident

It happens when workers work for a long time in a place with high temperature and humidity. The rise in body temperature leads to an imbalance of the water and sodium levels in the body, which cannot regulate the body temperature well, resulting in death.

8) “Crash” accident

It happens when workers collide with a moving forklift. If a forklift is moving fast, the worker may die.

2. Important things to be followed for no industrial accident

Workers must follow the instructions of the person in charge and follow the specified rules. Also, participate in workplace activities aimed at eliminating industrial accidents.

To eliminate industrial accidents, the following are important:

(1) 5S

(2) Proper attire

(3) Follow operating procedures and rules

(4) Use machines correctly

(5) Use detergents and chemicals with caution

(1) 5S

Even when you are busy at work, it is important to keep the workplace always in the same condition and take care of yourself and the people around you. The 5S learned in “Chapter 2: Food Hygiene” are important activities to prevent industrial accidents.

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a) Sorting, setting-in-order, and shining

Keep the workplace free of unnecessary items (sorting).

It is easier to work by deciding where to put tools, ingredients, etc., and having everyone move in the same way (“traffic line”). Place the box or pallet in a defined frame or along the tape on the floor (setting-in-order).

This reduces the risk of a fall accident.

Keep equipment and machines always in good condition (shining).

This reduces the possibility of sudden breakdowns in equipment and machines, thereby preventing industrial accidents such as caught in between.

b) Standardizing

This is useful not only for preventing food poisoning but also for preventing infection of workers.

c) Sustaining/Self-discipline

This allows workers to work in a workplace in the same condition every day. It leads to preventing industrial accidents, because they can work without worry.

(2) Proper attire

To prevent industrial accidents, you must work in proper clothes.

1) Proper wearing of work clothes

- When working, wear a set safe clothing (work clothes).
- Wear work clothes that are easy to move in and fit your body size.
- For work clothes with long sleeves, button the cuffs and work without rolling up the sleeves.

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2) Proper wearing of safety protective equipment

If you are instructed to wear safety protective equipment, you must wear it properly. The following are the safety protective equipment often used in food manufacturing plants.

Helmet	Head injury prevention	Safety glasses	Eye injury prevention
	Wear when working at a height of 2 meters or more.		Wear when handling chemicals and fine powder to prevent liquid or powder from entering the eyes. Also, wear during high-pressure washing work to prevent cleaning materials from getting into the eyes.
Rubber gloves	Burn prevention	Earplugs	Soundproofing
	Wear when handling hot items and chemicals. Don't put your hands in a hot liquid when wearing them. The liquid enters through the opening of the glove and your hands get burned.		Wear in a noisy place to prevent hearing loss.
Mitten gloves	Burn prevention	Heat-resistant apron	Burn prevention
	Made of heat-resistant cloth and rubber. Wear when touching hot objects.		Made of heat-resistant cloth and rubber. Wear when touching hot objects and chemicals, cleaning work, etc.
Mexcel gloves	Prevention of finger cuts	Safety shoes	Prevention of stress and wounds on the feet
	A kind of cut-resistant glove, laced with hard-to-cut fibers. Wear when handling a knife.		Attached steel plates or plastic plates to the toes and heels to prevent injury.
Stainless-steel gloves	Prevention of finger cuts	Boot with cover	Slip and burn prevention
	A kind of cut-resistant glove, made of stainless-steel netting. Wear when cutting meat and hard vegetables (such as pumpkin) with strong force.		Oil-resistant and non-slip soles are used. A cover prevents water from coming in from the top.

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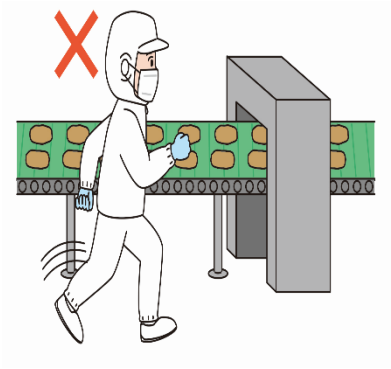
(3) Follow operating procedures and rules

1) Follow operating procedures

The operating procedures describe what you must do to prevent industrial accidents. To prevent industrial accidents, you must follow what is written in the operating procedures.

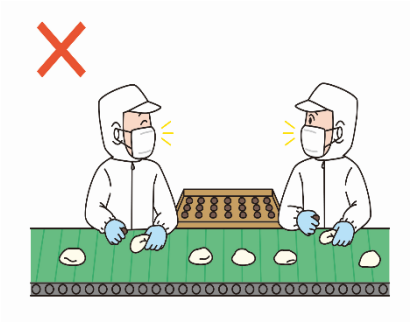
2) Follow basic workplace rules

Rules of the workplace



- Don’t run in the workplace.
- Walk down the designated passage and observe the way to cross the passage.
- When a forklift goes by, make eye contact with the driver and check while walking.
- Don’t go under the conveyor.
- Don’t run down or up stairs.

Rules for working



- Follow the procedure of the work.
- Before the work or turning on the machine, check with finger pointing and calling (*).
- Communicate and give signals when working with other workers.
- Work without looking away or chatting.
- Place knives and other tools in a designated place in a designated manner.
- If a dangerous point is found, report it to the person in charge immediately.
- If other workers are doing dangerous work, warn them not to do it.
- When leaving the workplace, speak to the person in charge before leaving.

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(*) Finger pointing and calling

While pointing at a signal, sign, utensil, work object, etc., say its name and condition aloud. This is done for the purpose of avoiding danger and confirming safety.

Temperature good!

3) Work with understanding the meanings of safety signs

Safety signs are easy to see and make it easy to understand things that workers should do and be careful about so that they do not get injured at work. In the workplace, you must understand the meanings of the safety signs and be careful not to cause injury or accident.

(*) For safety signs, see the Supplementary Materials.

(4) Use machines correctly

Major industrial accidents often occur when using machines. When you use a machine, you must work carefully and calmly.

1) Use a machine with an understanding of operating procedures

Understand operating procedures correctly and work with the machine. When two people work with a machine, always communicate with each other to work. If there are not enough people for the task, don't do it.

2) Conduct a pre-commencement inspection

Before starting work with equipment and machines, check that there is no abnormality, as follows.

This is called "pre-commencement inspection" and is an important task for stable daily production.

- Is there any dirt or anything stuck in it?

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- Does it smell strange?
- Is there any unusual sound or vibration?
- Is the cutter or slicer chipped?
- Are parts, equipment, and machines that are not supposed to move still?
- Are there any missing bolts, screws, or other parts?
- Does the safety device, whose operation is to be checked in the pre-commencement inspection, work normally?
- Can the lamp be turned on and off normally?

3) Comply with response to abnormalities

When a machine stops due to trouble, it is necessary to resolve the problem. If you take the wrong measures, it will lead to a serious industrial accident. Therefore, you must be careful.

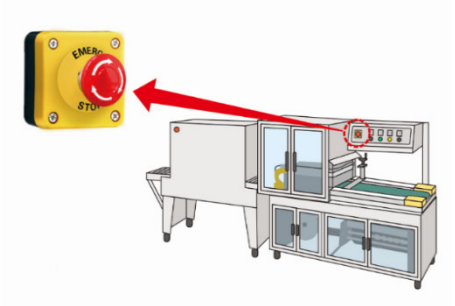
a) Keep your hand away from a machine while the power switch is on (operating)

Never put your hand into an operating machine. Especially, a machine that is stuck with an object seems stopped, but the cutting edge or the screw may be rotating inside. There have been many accidents in which the machine starts to move, and workers' hands get caught when the stuck object is removed. Again, keep your hand away from an operating machine.

Also, you should never put your hand into a machine that is operating slowly, because it has a strong moving force and may not stop even if you get caught in it.

b) Use an emergency stop button

A control panel has an emergency stop button. When you press the button, the machine stops immediately. When something unusual happens, the most important thing is to stop the machine first.



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c) Use a safety device

For machines with a safety device (fail-safe*), the machine stops automatically when the door is opened. You can resolve the problem while stopped. You must use the mechanism of this safety device when you work.

(*) Fail-safe

“Fail-safe” is a mechanism by which the machine stops automatically when a part breaks or a product is stuck. A safety device attached to a machine is also a fail-safe mechanism to avoid touching the operating machine by mistake.

d) Always turn off the power switch when repairing a conveyor.

A safety cover (foolproof*) is attached to a rotating part of conveyor chain and gear. This prevents workers from putting their hand in the machine by mistake. Many disasters have occurred because they worked with this cover off without turning off the power switch. Also, to prevent other workers from turning on the power switch again, hang a sign such as “Machine Under Repair” over the power switch to work safely.

(*) Foolproof

“Foolproof” is a system designed to prevent disasters even when people accidentally do or misunderstand something. A safety cover is a foolproof mechanism to keep workers’ hands away.

4) Keep machines working properly by inspection and maintenance

Inspection and maintenance are very important for stable operation of machines and to prevent accidents. Make sure to plan for inspections and maintenance even if the production is busy, as they cannot be skipped. The following three points are important:

- Display “under inspection and maintenance” on the operation panel of the machine so that others can see it.
- Lock the power switch to prevent the machine from working.
- Check safety devices as well.

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(5) Use detergents and chemicals with caution

Keep the following points in mind when using detergents and chemicals:

- To prevent detergents and chemicals from getting into your eyes or onto your hands, wear safety protective equipment such as safety glasses, gloves, and aprons.
- Always put the safety protective equipment in a handy place.
- Mixing chlorinated detergent and acid detergent for use is dangerous, because they generate toxic chlorine gas. Follow the rule of using detergent.
- Rubbing alcohol should not be placed near machines that get hot, such as ovens and air fryers, because alcohol may catch fire.

3. Response to abnormal situations or industrial accidents

(1) When an abnormal situation occurs

If you notice any abnormalities, take the following actions:

1) Check what is happening and let the person in charge and workers around you know loudly.
2) When you can judge by yourself, stop the machine operation by pressing the emergency stop button, etc., as necessary.
3) Follow the instructions of the person in charge. Don’t act on your own.

(2) When an industrial accident occurs

In the event of an industrial accident (when you find an injured or fallen person), don’t run toward them. It is because the person who tried to help may also be another victim. This is called a “secondary accident.” The first step you should take is the same as for “(1) When an abnormal situation occurs.”

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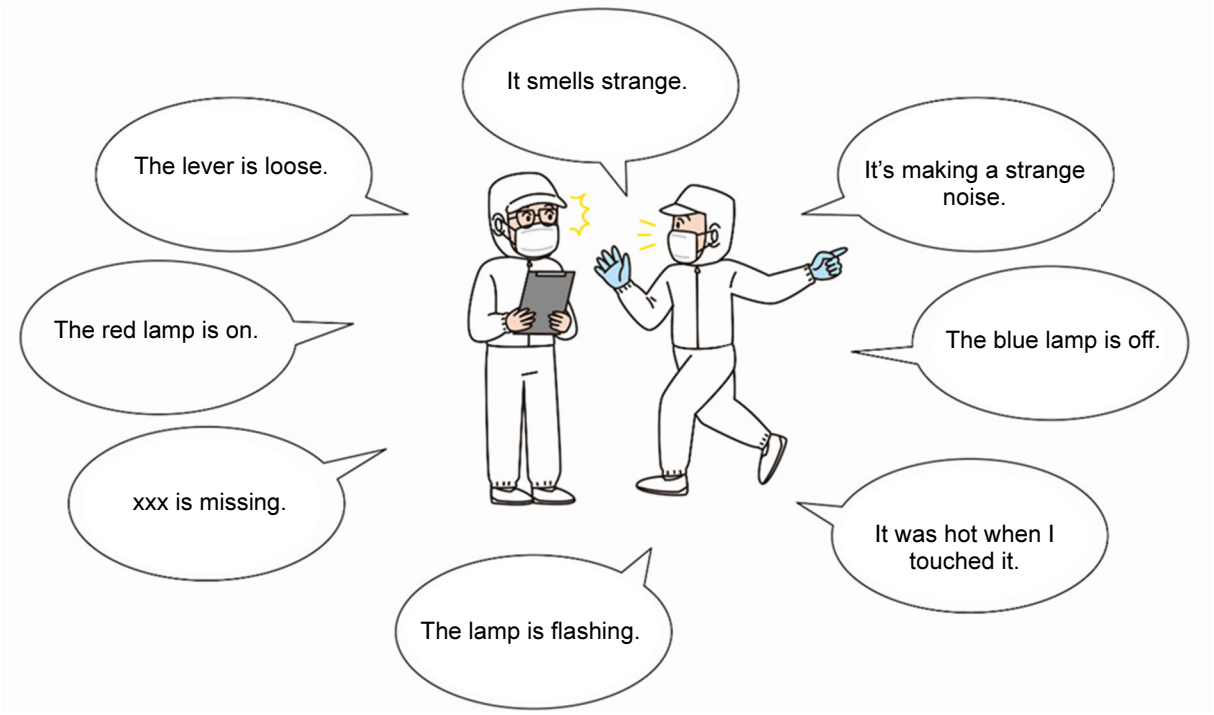
1) Check what is happening and let the person in charge and workers around you know loudly.
2) When you can judge by yourself, stop the machine operation by pressing the emergency stop button, etc., as necessary.
3) Follow the instructions of the person in charge. Don't act on your own.

It is important to conduct a drill on a daily basis in order to act properly when abnormal situations or industrial accidents occur. Regularly conduct evacuation drills for fire and other disasters as well as drills for pressing the emergency stop button.



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4. Build awareness of danger

It is important for unskilled workers to develop an ability to notice dangers to prevent industrial accidents. Learn this ability, and if you notice any danger at the workplace, report it to the person in charge.

(1) Learn about cases of industrial accidents

It is very important to know cases of industrial accidents in the manufacture of food and beverages. You should learn well the cases introduced in the company and work carefully so that you do not cause or suffer from the same accident.

1) Know cases of industrial accidents in the company

Cases of industrial accidents in the company are the most important cases that are familiar and easy to understand for people who do the same work with the same equipment. Therefore, learn and remember them well.

2) Learn about cases of industrial accidents outside the company

Cases of industrial accidents outside the company may also be introduced. It is useful to learn about the cases to prevent the same accident from happening, because there can be the same danger in the company. Learn well and be careful not to let the same accident happen in your work.

(2) Participate in near-miss activities

There is a case that a worker almost got injured while working. This is called a “near miss.”

There is a theory that before one serious industrial accident occurs, 29 minor injuries or accidents and 300 near misses that did not result in injury or accident occur due to the same cause. This is called the “accident triangle.”

From the accident triangle, fewer near misses will lead to fewer serious industrial accidents.

Accident triangle

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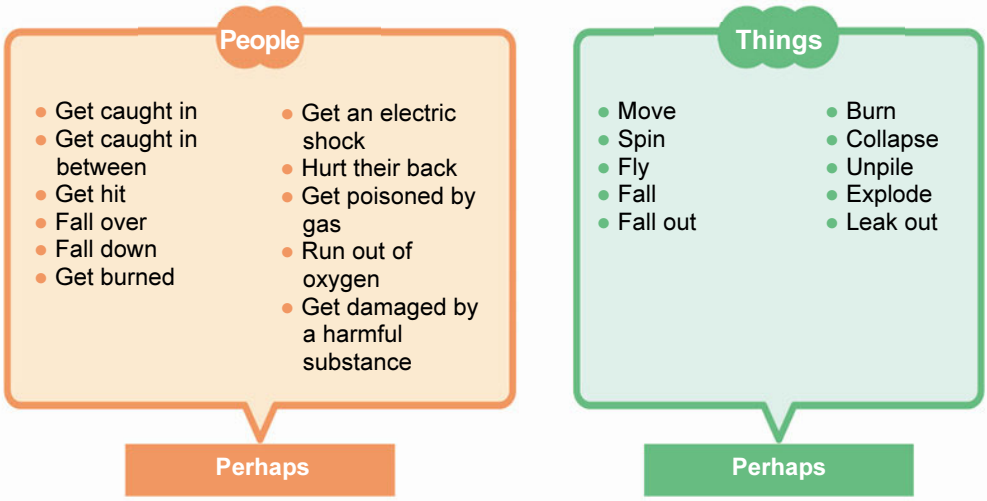
For this purpose, all the workers and the people in charge in the factory report their near misses to each other and record and share them, so that everyone can think about the cause of the near misses and how to prevent them from happening and improve the factory. This initiative is called “near-miss activity.”

The important thing is to share as many of your near misses as you can. You need to report even small mistakes. Participate in the activity with the desire to make the factory and workplace safer than now by sharing a lot of near misses and making improvements.

(3) Participate in risk prediction training

Risk prediction training gives participants an idea of where and what dangers are in the workplace or work, without having to experience near misses in person. It is training to think about the potential hazards before you start work or when you learn a new task, and then develop an ability to think about how to prevent industrial accidents caused by the hazards. It is also called KYT after the first letter of risk prediction training in Japanese (Kiken Yochi Training).

Source: The Ministry of Health, Labour and Welfare Safety and Health, “For Work Safety and Health: To those working in the manufacturing industry”



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There are various methods of risk prediction training, such as showing pictures and illustrations of equipment and machines during operation as well as the clothes and posture of workers and having each worker answer where and what hazards are present. The following examples are ideas to help workers become always cautious, thinking that there might be a danger anywhere.

- Perhaps hot water gets into my boots and burn my foot.
- Perhaps a forklift comes out and hit me.
- Perhaps the loaded cargo unpiles and falls.
- Perhaps the floor in front of the freezer entrance is slippery because of a thin layer of ice.
- Perhaps the kitchen floor is dirty with oil and slippery.
- Perhaps the fire on the gas stove cooking boiled food may have gone out without anyone noticing, and the gas may have spread inside.

5. Cases of near misses and prevention of industrial accidents

(1) “Falls” accident

Case 1

[Situation]

- When a worker was going to move, holding a tray with both hands, he slipped on the wet floor and almost fell over.

[Cause]

- The water on the floor was not thoroughly wiped off.

[Countermeasures]

- If the floor is wet, wipe off the water thoroughly.

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Case 2

[Situation]

- When a worker was walking down a parking lot toward a truck, holding bread boxes with both hands, he almost tripped over an empty box in the passage.

[Cause]

- There was an empty box in the passage.
- He could not see the floor because he was carrying some bread boxes.
- The safety check of the passage was not sufficient.

[Countermeasures]

- Don’t leave things in the passage even if they are used for work.
- Check the safety of the passage before starting work.
- When carrying more than one box, hold a limited number of boxes so that they do not obstruct your view.

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(2) “Caught in or in between” accident

Case 1

[Situation]

- A machine on the packaging line stopped because a product was jammed. When a worker opened the cover without pressing the stop button to remove the jammed product, the machine suddenly started to move, and his hand almost got caught.

[Cause]

- He did not confirm that the packaging line stopped completely by pressing the stop button of the packaging line.
- There was no safety device to automatically stop the machine when the cover was opened.

[Countermeasures]

- Install a safety device that automatically stops the machine when the cover is opened.
- Press the stop button and confirm that the machine has stopped before starting work.

Case 2

[Situation]

- When a worker was cleaning a conveyor belt without stopping it, a wiping cloth was caught, and his hand almost got caught.

[Cause]

- The conveyor belt was not stopped when cleaning.

[Countermeasures]

- When cleaning, removing foreign objects, inspecting, repairing, etc., press the stop button and confirm that the machine has stopped.

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(3) “Cuts/Scratches” accident

Case 1

[Situation]

- When a worker was slicing bread while pushing it with his hand on the work bench, the slicer blade almost cut his finger.

[Cause]

- Instead of using a pusher, he was pushing bread by hand to slice it.

[Countermeasures]

- When using a slicer, use a pusher to push bread.

Case 2

[Situation]

- When a worker was cutting frozen fish with a knife, the knife he was holding slipped and almost cut his other hand.

[Cause]

- He was not wearing a protective glove (cut-resistant glove) on the other hand.

[Countermeasures]

- Hold and cut according to working posture and frozen fish to be processed.
- Wear cut-resistant gloves.

(4) “Falling” accident

Case

[Situation]

- When a worker took products off the shelf with both hands and was going to get off a stepladder, the stepladder moved, and he lost his balance and almost fell off.

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[Cause]

- The safety lock of the stepladder was not on.

- There was no one to hold the stepladder so it would not fall over.

[Countermeasures]

- Always use stepladders with safety locks on. When getting on and off a stepladder, leave one hand open and grab the stepladder.
- For large products, two people work together.

(5) “Burn” accident

Case

[Situation]

- When a worker was going to transfer an iron plate of the oven to another worktable, he almost touched the iron plate with his bare hands without noticing that it was hot.

[Cause]

- Although the iron plate was hot right after taking it out of the oven, he was going to carry it with his bare hands without checking the temperature of the iron plate.

[Countermeasures]

- Wear protective gloves when carrying iron plates, pots, kettles, etc.
- Check the temperature before carrying, and if the temperature is high, tell the people around you to be careful.

(6) “Lower back pain” accident

Case

[Situation]

- When a worker lifted a heavy kettle with both hands, he felt a strong pain in his lower back.

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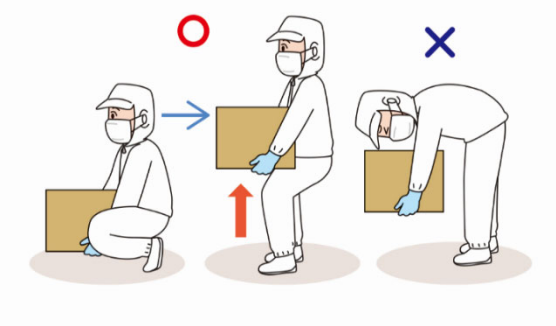
[Cause]

- He tried to lift a heavy object in an unstable position.



[Countermeasures]

- When lifting a heavy object, bring your body close to the heavy object, bend your knees, crouch down, hold the heavy object, and stand up slowly while straightening your knees.
- When carrying heavy objects, use a trolley if possible.

(7) “Heatstroke” accident

Case

[Situation]

- During the process of red bean processing, when a worker was putting beans into a hopper and weighing them repeatedly, he became unsteady when moving and was diagnosed with heatstroke.

[Cause]

- He continued working in a place with high temperature and humidity without taking a break.
- He was sweating a lot but did not drink water or consume salt.

[Countermeasures]

- When working in places with high temperature and humidity, take frequent breaks to drink water and consume salt.

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- Wear clothes that breath, absorb sweat, and dry easily.

(*) If you experience heatstroke-like symptoms in the workplace, take the following actions:

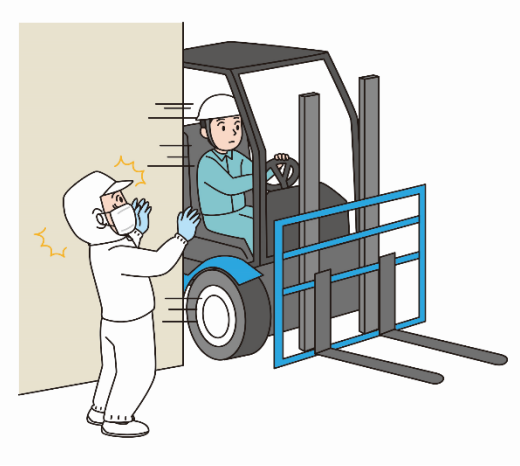
1) Let the person in charge know.
2) Move to a cool place.
3) Take some rest.
4) Unbutton the work clothes and cool your body (especially your neck, armpits, and groin).
5) Drink salty water or electrolyte drinks.

(8) “Crash” accident

Case

[Situation]

- When a worker was carrying empty boxes to the storage area outside the workplace with a forklift, he did not stop the forklift at the warehouse entrance and almost hit someone from the side.



[Cause]

- He did not stop the forklift at the warehouse entrance.

[Countermeasures]

- Forklift drivers must stop at the warehouse entrance and check the safety by finger pointing and calling.

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Supplementary Materials

Examples of safety signs used in the workplace

Main safety signs

1) Entry prohibited sign	2) No running sign	3) Close door sign
		
4) Do not touch signs		
		
5) Pinch point signs		
	 **WATCH YOUR HANDS**	 **WATCH YOUR HANDS**
6) Burn hazard signs		
 **BURN HAZARD**	 **BURN HAZARD**	

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7) Trip hazard signs		
 Caution Slippery Surface WATCH YOUR STEP		 DANGER! RISK OF FALLING
8) Falling hazard signs		9) Cutting hazard sign
	 FALL HAZARD!	 KEEP HANDS CLEAR
10) Machine operation hazard signs		
		 KEEP AWAY FROM MACHINERY WHILE OPERATING
11) Electrical hazard sign	12) Overhead hazard signs	
		 WATCH YOUR HEAD

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13) Eye protection signs	
	
14) Emergency exit signs	
	
15) Fire extinguisher signs	
	 **FIRE EXTINGUISHER**

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Index

(Note) This index covers Chapters 1 through 3 of this textbook.

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