

## **Technical Guide for COVID-19 Prevention and Control in Cold Chain Food Production and Operations (Second Edition)**

### **1. Basis and scope of application**

This guide is established to standardise and guide the responsibilities of companies and personnel involved in cold chain food production and operations during the normalisation of COVID-19 prevention and control, focusing on cold chain food production operators and key processes in production and operations, with reference made to the following documents published by the Joint Prevention and Control Mechanism of the State Council in response to COVID-19:

- Guidelines for Prevention and Control of COVID-19 in Meat Processing Plants (2020, No. 216);
- Technical Guidelines for COVID-19 Prevention and Control in Farmers' Markets (2020, No. 223);
- The Prevention and Control of COVID-19 (8th Edition) (2021, No. 51); and,
- Circular of the Joint Prevention and Control Mechanism of the State Council for COVID-19 on Strengthening COVID-19 Epidemic Prevention and Control in Port Cities (published by the General Office of the State Council, 2021, No. 14);

as well as the relevant national food safety standards and Guidance for Preventing Transmission of COVID-19 within Food Businesses (August 2021), issued by the Food and Agriculture Organization of the United Nations.

This guide is applicable to the prevention and control of COVID-19 contamination in production, loading and unloading, transportation, storage and sales of cold chain food that are processed by methods such as freezing and cold storage, where the products are always kept at low temperatures from factory to sales. Companies and personnel involved in the storage and import of cold chain food in port regions are to refer to this guide for implementation.

This guide aims to prevent cold chain food and related personnel from COVID-19 infection, highlighting COVID-19 prevention and control by high-risk personnel in operations such as handling and unpacking in key places such as central warehouses or initial cold storage, and focusing on reinforcing the cleaning and disinfection of cold chain food packaging. The premise for this guide is that production operators strictly abide by the laws and regulations and the relevant national food safety standards, and implement the various regulations by the local authorities for COVID-19 prevention and control.

### **2. Health Management of Personnel for COVID-19 Prevention and Control**

The basis of preventing COVID-19 contamination of cold chain food is the health of the personnel involved. Operators of cold chain food production, loading and unloading, transportation, storage, sales and F&B services shall promptly make adjustments and update the system of personnel health management according to the requirements of COVID-19 prevention and control, and to improve management measures and strictly implement personal protection of personnel.

## **2.1 Establish a health registration system for employees.**

Cold chain food production operators must register the 14-day travel and health status of employees (including new and temporary employees) and establish health cards for employees. New employees must present proof of COVID-19 vaccination, negative results of nucleic acid test done within the past 48 hours, normal health and travel status Quick Response (QR) codes. Operators must be aware of the movements and health status of the employees.

## **2.2 Daily health monitoring of employees**

Cold chain food production operators shall strengthen access management and health monitoring of employees, and establish a record of health status (including 10 main symptoms: fever, dry cough, fatigue, loss of smell and taste, nasal congestion, runny nose, sore throat, conjunctivitis, muscle ache and diarrhoea) and risk exposure reporting system for all employees. Operators shall implement the “Green Pass” system for by setting up temperature measuring points at the entrances of food production and operation areas, and implementing measures such as registration, temperature measurement, disinfection and inspection of health status QR code.

## **2.3 Nucleic acid testing of personnel**

Nucleic acid testing is an important means for early detection of infected persons. Cold chain food personnel shall carry out the relevant tests according to The Prevention and Control of COVID-19 (8th Edition) (2021, No. 51). The frequency of nucleic acid testing shall be appropriately increased for high-risk personnel in key locations and operations.

High-risk personnel include, but are not limited to, those involved in handling, loading and unloading, unpacking, disinfection, forklift operations, warehousing, sampling, garbage removal, etc. in central warehouse or initial cold storage, who first come into direct contact with cold chain food without decontamination, as well as the front-end personnel of food processing plants importing cold chain food, who are involved in forms of thawing activities such as handling and unpacking.

High-risk personnel shall have high-frequency nucleic acid testing, with specific frequencies appropriately adjusted based on local risk assessment. In principle, reasonable arrangements for nucleic acid testing shall be made to ensure that there are personnel of the same category tested daily.

## **2.4 Registration and management of external personnel**

The entry of external personnel into production and operation areas is to be minimised. It is necessary to register the company, health status, contact with personnel in the epidemic outbreak areas, etc. for external personnel coming into production and operation areas, and to implement measures such as the inspection and registration of the health and travel status QR codes, temperature measurement and personal protection (such as wearing masks) before entering. Upon entry and exit, personnel inside vehicles must not leave the vehicle, and those who need to leave the vehicle shall abide by the above requirements. Security guards, working staff and drivers shall avoid unnecessary contact.

## **2.5 Health requirements for personnel**

2.5.1 Healthy employment. Ensure good health before taking up the employment, and report health information to the operator. Proactively allow temperature measurement by the operator. If there are symptoms such as fever, dry cough and fatigue, immediately and proactively report and promptly seek medical assistance.

2.5.2 Personal protection. Personnel shall correctly wear masks, gloves and work garments at work. Work garments shall be kept clean and tidy, washed regularly and disinfected when necessary. Apart from work garments, personnel in special operations (live slaughter, machine-cutting, etc.) shall wear waterproof aprons, rubber gloves, etc. according to protection requirements. It is recommended that food personnel wear disposable gloves, which must be changed frequently, and wash their hands between changing gloves and before wearing them. To prevent secondary contamination of protective equipment, gloves must be changed after non-food related activities (such as opening/closing doors and emptying garbage bins by hand).

2.5.3 Pay attention to personal hygiene. Cover the nose and mouth with tissue paper or elbow and arm when sneezing or coughing. Do not spit anywhere and pay attention to hygiene when blowing the nose. Try to avoid touching the mouth, eyes and nose with hands.

2.5.4 Reinforce hand hygiene. When handling goods or when both hands touch public objects such as shelves, handrails, etc., promptly wash both hands with hand sanitiser or soap with running water, or rub both hands with quick-drying hand disinfectant.

## **2.6 Establish a reporting procedure for health abnormalities**

Employees shall promptly report to the production operator's top management if they discover that they or the persons with whom they live are suspected to display symptoms such as fever, dry cough and fatigue, and the reporting may be directly or escalated level by level depending on the situation. Once the operator discovers that its employees display the above abnormal health symptoms, effective measures shall be taken to promptly exclude them and the employees with whom they have close contact from the food operations environment, regardless of their health symptoms. It is suggested that operators require workers to submit "nil" reports according to the prevention and control regulations of the local authorities in areas with high COVID-

19 infection risk.

## **2.7 Procedure for returning employees**

Based on employees' registration and health records in the production and operation areas, promptly track the treatment and recovery status of employees with abnormal health, physical discomfort, suspected or confirmed COVID-19 infection (of patients or those with asymptomatic infection), and scientifically assess whether they meet the requirements to return to work after recovery. Quarantine can cease for confirmed COVID-19 cases whose symptoms subside and whose two PCR tests of at least a 24-hour interval are negative. Personnel who are close contacts of COVID-19 patients shall also meet the above control requirements before returning to work.

## **2.8 Reinforce publicity on prevention and control**

Carry out various forms of health education, guide personnel to understand the knowledge and skills related to the prevention and treatment of COVID-19 and other infectious respiratory diseases, develop good hygiene habits and increase awareness of personal protection.

## **3. Prevention and control requirements for loading and unloading, storage and transportation**

### **3.1 Hygiene requirements for workers involved in loading and unloading, etc.**

High-risk personnel who are involved in handling, loading and unloading, unpacking, disinfection, etc. in central warehouses or initial cold storage, who first come into direct contact with imported cold chain food without decontamination, are required not to be replaced and are to be managed in a closed-loop. Refer to paragraph 2.3 for nucleic testing.

In addition to the general personal hygiene, these personnel shall wear special work garments and headwear, disposable medical masks, gloves, etc. before handling goods, and wear goggles and face shields when necessary to avoid frequent contact between the surfaces of the goods and the personnel's bodies.

Especially when loading and unloading cold chain food imported from areas with COVID-19 outbreak, the relevant personnel must wear masks during the entire process of handling goods. They must avoid contact between the goods the face, avoid touching the nose and mouth with hands, and avoid direct contact with frozen aquatic products, etc. that may be contaminated by COVID-19. If masks are damaged during handling, they shall be immediately replaced.

### **3.2 Hygiene requirements for drivers**

In addition to the hygiene requirements for personnel in personal protection, the personnel (drivers, etc.) who transport imported cold chain food are not allowed to wilfully open the containers or unpack the packaging to come into direct contact with the cold chain food. When the vehicle enters and exits the premises, the driver and

accompanying personnel in the vehicle shall avoid unnecessary contact with the security guards and working staff.

### **3.3 Hygiene Management of the sources of goods**

For imported cold chain food, the importer and shipper shall cooperate with the relevant departments in the sampling and testing of the food and packaging. For food from other ports, the distributor shall proactively request for the relevant food safety and epidemiological testing information from the supplier. If the importer or shipper engages a third-party logistics company to provide transportation, warehousing and other services, the relevant food safety and epidemiological testing information shall be proactively provided to the third-party logistics company.

In the cold chain logistics process, the use of support or padding in the packaging, if necessary, shall meet the relevant food safety and hygiene requirements. The logistics packaging shall specify the temperature for the transportation and storage of the cold chain food. Operations management, such as loading, unloading and handling of goods, is to be reinforced to prevent the goods from coming into direct contact with the ground, and the cold chain food packaging must not be wilfully opened. The temperature of cold chain food shall always be maintained within the allowable range during transportation, storage, sorting, etc. Records of the time of delivery and receipt, temperatures and other information of shall be kept.

### **3.4 Hygiene management for vehicles**

The interior of the vehicle compartment shall be kept clean, non-toxic, pest-free, odourless and contamination-free, and regular preventive disinfection shall be carried out. Refer to Annex 2: Technical Guide for Disinfection for COVID-19 Prevention and Control in Cold Chain Food Production and Operations (Second Edition) for the specific disinfection measures.

### **3.5 Hygiene management for storage facilities**

The inspection of cold chain food storage in warehouses shall be reinforced, by checking the internal temperature in addition to the appearance and quantities. Warehouse storage management shall be reinforced by placing cold chain food on respective pallets or shelves. Cold-chain food shall be stored according to their characteristics in the appropriate partitions or according to storage codes. Cold chain food with different temperature and humidity requirements and are easily cross-contaminated shall not be mixed in storage. The temperature and humidity in the warehouse shall be regularly monitored and remain stable to meet the storage requirements of cold chain food. The warehouse interior, shelves, work tools, etc. shall be cleaned and disinfected regularly. Refer to Annex 2: Technical Guide for Disinfection for COVID-19 Prevention and Control in Cold Chain Food Production and Operations (Second Edition) for the specific disinfection measures.

## **4 Prevention and control requirements for production and processing**

### **4.1 Hygiene requirements for personnel**

Implement according to the requirements at paragraph 2.5.

High-risk personnel at the front-end of processing plants involved in forms of thawing activities such as handling, unpacking, etc. of imported cold chain food are required to not be replaced and are to be managed in a closed-loop. Refer to paragraph 2.3 for nucleic acid testing.

## **4.2 Maintain safe-distancing**

A distance of at least 1m shall be maintained between employees. The feasible measures to maintain distance in the food processing environment include: preventing employees from facing each other at work by placing the workbench only on one side of the production line, staggering production spaces or installing barriers in the middle of the production line; strictly limiting the number of employees in food preparation areas and excluding all non-essential personnel, as well as dividing employees into groups or teams and reducing communication and interactions between them.

## **4.3 Protection and inspection of incoming goods**

4.3.1 Protection of loading and unloading. Workers who need to have direct contact with cold chain food and goods during loading and unloading shall wear work clothes and headwear, disposable medical masks, gloves, etc. before moving the goods. When necessary, they must wear goggles and face shields to avoid frequent contact between the surfaces of the goods and their bodies.

4.3.2 Control of sources. Cold chain food companies shall competently implement supplier compliance inspection and evaluation, thoroughly check and inspect every batch of incoming food, truthfully record and save the information on inspection of incoming food and raw materials, ex-factory inspection, sales, etc. in accordance with the law, and ensure food traceability. The records and certificates shall be kept for not less than 6 months after product expiry. If there is no clear expiry, the records and certificates shall be kept for not less than 2 years.

4.3.3 Proof of inspection. For imported cold chain food, the importer or shipper shall cooperate with the relevant departments to conduct sampling inspections of the food and their packaging. For food products from other ports, the distributor shall proactively obtain the relevant information on food safety and epidemiological testing from the supplier.

## **4.4 Cleaning and disinfection**

Refer to Annex 2: Technical Guide for Disinfection for COVID-19 Prevention and Control in Cold Chain Food Production and Operations (Second Edition).

## **4.5 Other protective measures**

4.5.1 Ventilation requirements. Natural ventilation is preferred in common factory areas, and auxiliary mechanical ventilation can be used where conditions are

not met. Closed factory areas shall maintain indoor air circulation and provision of safe air-conditioning. The air-conditioning and ventilation system shall be regularly inspected, cleaned and disinfected to ensure clean and safe operation.

4.5.2 Drainage facilities. There shall be an effective and unimpeded sewer, which shall be equipped with water taps on the ground and disinfection facilities for flushing and disinfection of sewage. The sewerage discharge shall comply with the relevant regulations.

## **5. Control requirements for sales**

Food operators such as central cold chain food trading markets (wholesale markets for agricultural products, farmers' markets, community vegetable markets), supermarkets, convenience stores, F&B establishments and self-run e-commerce operators shall be equipped with the corresponding refrigeration and freezing facilities.

### **5.1 Hygiene requirements for personnel**

To be implemented according to the requirements at paragraph 2.5. In addition to work clothes, food operators in special stalls such as live slaughter will need to wear waterproof aprons, rubber gloves, etc.

### **5.2 Maintain safe distancing**

The number of customers entering the cold chain food sales area shall be reasonably controlled to avoid gathering and crowding as well as to maintain safe-distancing between people of at least 1m, which shall be adjusted accordingly in enclosed spaces. Measures such as ground markers can be used to guide and manage customers in orderly queues so that they maintain safe-distancing, especially in crowded areas such as the service desks and checkout counters.

### **5.3 Cleaning and disinfection**

Refer to Annex 2: Technical Guide for Disinfection for COVID-19 Prevention and Control in Cold Chain Food Production and Operations (Second Edition).

### **5.4 Warning notifications**

5.4.1 Signs shall be installed at the entrances to request customers not to enter the store if they are in ill health, unwell or suspected to have COVID-19 symptoms.

5.4.2 There shall be regular broadcasts or posted notices at cold chain food retail areas (shops, markets and supermarkets) to remind customers to maintain safe-distancing and promptly clean their hands. It is suggested that consumers to wash the shopping bags, which they bring to carry cold chain food, before reusing them.

### **5.5 Other protective measures**

To reduce contact, glass barriers shall be installed at checkouts and other counters, and contactless payment encouraged. Consideration shall be given to not publicly display or sell unpacked cold chain food at self-service counters.

## **6. Control requirements for F&B processing**

To prevent and control COVID-19 contamination of cold chain food F&B services, F&B service operators shall pay attention to the following.

### **6.1 Hygiene requirements for personnel**

To be implemented according to requirements at paragraph 2.5.

### **6.2 Maintain safe-distancing**

6.2.1 Appropriate measures shall be taken to prevent over-crowding of personnel, and food personnel shall maintain a distance of at least 1m.

6.2.2 Seating arrangements for dining in shall meet safe social distancing.

6.2.3 Ground markers shall be used in stores to enable customers to maintain a distance, especially in crowded areas such as the service desks and checkout counters.

### **6.3 Cleaning and disinfection**

Refer to Annex 2: Technical Guide for Disinfection for COVID-19 Prevention and Control in Cold Chain Food Production and Operations (Second Edition).

### **6.4 Other protective measures**

6.4.1 Provide cleaning disinfectant. Hand sanitiser or wash-free disinfectant shall be provided for employees and consumers entering and leaving the dining areas.

6.4.2 Prevent cross-contamination. Raw and cooked food shall be separately processed and stored. Tools and utensils for processing uncooked food shall be thoroughly disinfected before they can be used to contain or process cooked food.

6.4.3 Avoid unnecessary physical contact. Contactless mobile payment, contactless delivery, etc. are encouraged.

6.4.4 Air circulation shall be maintained and the windows of indoor spaces shall be frequently opened for ventilation.

6.4.5 Provide cooked food as far as possible. During the epidemic, food shall be thoroughly heated.

6.4.6 F&B services shall advocate separate servings, and shared ladles and chopsticks shall be provided where separate servings are not possible.

## **7. Emergency response measures for affected areas**

Cold chain food production operators shall formulate COVID-19 emergency response plans to promptly deal with and report the epidemic situation and to effectively prevent COVID-19 transmission.

### **7.1 Emergency response for personnel with abnormal health status**

Once a confirmed COVID-19 case or personnel suspected of abnormal health status related to COVID-19 is discovered in the cold chain food production and operation areas, it is necessary to implement the prevention and control measures to prevent internal proliferation and control external transmission, cooperate with the relevant departments to carry out epidemiological investigation, tracing and management of close contacts, disinfection of infection areas, etc., as well as to carry out sampling and nucleic acid testing at the areas where the infected personnel works or have been in, as well as the processed food in these areas. If there is an air-conditioning and ventilation system, it shall be concurrently cleaned and disinfected, and its use shall resume only after it has passed the evaluation. The work areas shall be temporarily closed based on the severity of the epidemic situation, and production shall resume after the situation is under control.

Measures such as cutting off transmission and quarantining close contacts shall be taken, and contaminants shall be disposed of according to regulations based on the requirements of COVID-19 prevention and control.

### **7.2 Emergency response for discovery of positive nucleic acid test samples**

Upon receiving notification of positive nucleic acid test samples for COVID-19, the cold chain food production operators shall quickly start their emergency response plan, and promptly take emergency actions on the items and the environment concerned according to local requirements and under the guidance of professionals. They are to temporarily seal up, cooperate in taking samples of and decontaminate the items concerned, disinfect the work areas, and promptly carry out nucleic acid testing and health screening for personnel who may have come into contact with the items. Before taking action on the items, the normal functioning of refrigeration equipment such as refrigerators, freezers and cold stores must be ensured, so as to avoid decomposition or spoilage and possible spread of contaminants. Spillage or leakage during transportation of the items concerned shall be avoided, and the personnel involved in their clearing and transportation shall strictly adopt personal protection.

Cold chain food that are tested positive in nucleic acid testing for COVID-19 shall be handled in accordance with the relevant requirements of the classification and categorisation of cold chain food for COVID-19 prevention and control.

## **Technical Guide for Disinfection for COVID-19 Prevention and Control in Cold Chain Food Production and Operations (Second Edition)**

### **1. Basis and scope of application**

This guide is established to standardise and guide the prevention and control of COVID-19 in cold chain food production and operations, to prevent COVID-19 contamination of food packaging materials, with reference to the following documents published by the Joint Prevention and Control Mechanism of the State Council in response to COVID-19:

- Guidelines for Prevention and Control of COVID-19 in Meat Processing Plants (2020, No. 216);
- Urgent Notice on Reinforcing COVID-19 Nucleic Acid Testing and Other Work on Cold Chain Food (2020, No. 220);
- Technical Guidelines for COVID-19 Prevention and Control in Farmers' Markets (2020, No. 223); and,
- The Prevention and Control of COVID-19 (8th Edition) (2021, No. 51),

as well as the relevant national food safety standards and Guidance for Preventing Transmission of COVID-19 within Food Businesses (August 2021), issued by the Food and Agriculture Organization of the United Nations.

This guide is applicable to cold chain food that are processed by freezing, cold storage and other methods, and which are always kept in low temperatures from the factory to sales. It is used to guide food production operators and individuals in normal operations, in loading and unloading, transportation, storage, production and sales of cold chain food, and in the disinfection of cold chain food imported from high-risk COVID-19 areas overseas during the normalisation of COVID-19 prevention and control. Companies and personnel involved in the storage and import of cold chain food in port regions are to refer to this guide for implementation.

The premise of this guide is that food production operators and individuals strictly abide by the laws and regulations and relevant national food safety standards, and implement the various regulations by the local authorities for COVID-19 prevention and control.

### **2. Cleaning and disinfection for production and processing**

In the production and processing of cold chain food, an effective cleaning and disinfection system for processing personnel, production environment and related equipment and facilities shall be established, according to the characteristics of the

raw materials and products as well as the features of the technology used in production and processing. The implementation and effectiveness of the disinfection shall be evaluated regularly.

## **2.1 Food production and processing personnel**

Food production and processing personnel who enter the work areas shall ensure hand hygiene by rubbing their hands with an appropriate amount of quick-drying hand disinfectant until they are dry. Keep away from sources of fire when using the hand disinfectant. This is premised on ensuring personal health and meeting the requirements of personal protection.

## **2.2 Outer packaging of raw materials and semi-finished products**

2.2.1 Before the raw materials of cold chain food and semi-finished products from high-risk COVID-19 areas (countries) enter the plant or storage, strict and effective disinfection shall be carried out on the outer packaging. Cooperation among departments shall be reinforced to, in principle, carry out preventive disinfection only once on the imported cold chain food transportation vehicles and packaging. Repeated disinfection shall be avoided.

2.2.2 Equipment (such as transport containers, ladles, tongs, etc.) used in moving cold chain food raw materials or semi-finished products shall be promptly cleaned and disinfected after each use.

2.2.3 The raw materials of food and/or semi-finished products from overseas epidemic outbreak areas that have been tested and found to be contaminated by COVID-19 shall be handled according to the relevant requirements of the classification and categorisation of cold chain food for COVID-19 prevention and control.

## **2.3 Production and processing equipment and environment**

2.3.1 Equipment and appliances. Appliances used before and after processing shall be placed separately and kept properly to avoid cross-contamination. All equipment and appliances after production and processing (or when necessary during production and processing) shall be effectively cleaned and disinfected. It must be ensured that the selected cleaning and disinfection procedures and disinfectants can effectively kill the COVID-19 virus.

2.3.2 Environment. The disinfection frequency of high-risk areas, such as the environment between the various production stages and machines for cold chain food raw material processing, between ready-to-eat and cooked food production, and cold stores, shall be increased. The work environment shall be thoroughly cleaned and disinfected during and after production. In particular, the cleaning and disinfection frequencies shall be increased for the various work surfaces, contact surfaces/points (door handles, switches, appliance handles, telephones, toilets, etc.) and crowded environments.

2.3.3. The surfaces of containers, equipment and environment that food that are rich

in proteins and fats, such as meat, aquatic and egg products, come into contact with must be thoroughly cleaned before disinfection. This is because they easily form dirt on contact surfaces which are difficult to remove, and the production and processing environment is usually low in temperature and high in humidity. This is also to improve the effectiveness of disinfection, minimise the amount of disinfectant used and shorten the interaction time between the disinfectant and the surfaces,

#### 2.3.3.1 Selection of cleaning agent

The commonly used cleaning agents for food processing equipment and environments include alkaline solution, salt solution (such as phosphate, carbonate, silicate), acid solution (such as citric acid, phosphoric acid) and synthetic detergents (such as anionic, cationic and non-ionic alkaline detergent), etc. Among these, alkaline solution is the most commonly used cleaning solution for the processing environment of meat, aquatic and egg products, and 1.5% sodium hydroxide solution which can saponify fat and hydrolyse protein deposits can be used as cleaning agent. In addition, all synthetic detergents can also effectively remove meat residues, fats and dirt, and when used they must be in full contact with the surfaces to be cleaned at an appropriate temperature for a certain period of time before washing with water. Another way to facilitate fat saponification for easy cleaning is to prepare protease solution with low concentration alkaline solution to break down proteins. Enzymes are deactivated at high pH and high temperatures, and keeping the pH and temperature of the prepared enzyme solution moderate can greatly reduce the corrosion of the surfaces to be cleaned.

#### 2.3.3.2 Cleaning procedure

- (1) To reduce the use of detergent and water, physically remove the dirt on the surfaces first.
- (2) Rinse off the dirt with water. Try not to rinse with high-pressure water so as to reduce aerosol formation.
- (3) Apply alkaline solution or synthetic detergent/enzyme solution at 50-55°C to the surfaces to be cleaned. After 6-12 minutes of contact, clean and wipe the surfaces. To ensure that the detergent is in full contact with the surface, it is best to use a foaming detergent to clean vertical surfaces.
- (4) Rinse off the alkaline solution or detergent with clean water.
- (5) As alkaline solution cannot remove scale or rust, acidic solution (such as phosphoric acid, hydrochloric acid or organic acid like citric acid and gluconic acid) can be used.

#### 2.3.3.3 Disinfection

- (1) To increase the effectiveness of disinfection and prevent the reduced activity of the disinfectant due to insufficient contact with the surfaces, all the equipment or surfaces to be disinfected must be thoroughly cleaned according to the above procedures before disinfection. The commonly used disinfectants contain chlorine and iodine or are quaternary ammonium solutions.
- (2) Whether the disinfected surfaces need cleaning depends on the disinfectant used. Disinfectants containing quaternary ammonium solutions or iodine should

- be thoroughly rinsed off with water after use.
- (3) If the equipment surfaces corrode after disinfection, oil may be applied to the corroded area for protection. Food-grade oil need not be removed but non food-grade oil must be cleaned and removed before the start of the next work shift.
  - (4) Use in-situ cleaning to continuously clean moving conveyor belts and other parts of the production and processing equipment.

### **3. Cleaning and disinfection during transportation and distribution**

#### **3.1 Personnel**

In the distribution of cold chain food, drivers and transport attendants shall maintain personal hand hygiene. The vehicles shall be equipped with alcoholic hand sanitiser, disinfectant and paper towel to ensure that the hands are disinfected regularly in the absence of clean water for hand-washing.

#### **3.2 Surfaces**

Drivers shall wash or disinfect their hands before transporting or delivering documents to the company's employees. To avoid cleaning the returned items, the documents are best placed in disposable containers and packaging material. Reusable containers shall be regularly and appropriately cleaned and disinfected.

Surfaces that personnel frequently touch, such as steering wheel, door handles and mobile devices, must be regularly disinfected as they are most likely to be contaminated by viruses.

It is strictly prohibited to open and unpack cold chain food during transportation. If opening and unpacking are necessary, disinfection must be carried out according to the requirements of paragraph 2.2.

#### **3.3 Transport vehicles**

To prevent contamination of cold chain food, drivers must ensure regular cleaning and disinfection of vehicles, transportation equipment and containers. In the transportation of mixed goods, food must be separated from other goods as much as possible during loading. The interior and exterior of the vehicle compartments which may be touched by personnel must be thoroughly disinfected before and after every transport trip.

### **4. Cleaning and disinfection during sales**

- 4.1 Personnel working in the cold chain food sales area shall maintain hygienic operations and frequently wash their hands with hand sanitiser to keep their hands clean and hygienic.
- 4.2 Promptly clean and disinfect the surfaces that personnel frequently touch, such as handles (of doors, cold storage equipment, containers and trolleys) and buttons (of counters and electric weighing devices). After daily operations, the

work areas shall be completely disinfected.

- 4.3 Convenience for customers to wash and disinfect their hands. The store shall ensure that its hand-washing facilities are functioning properly and that it is equipped with quick-drying hand disinfectant. Where possible, sensor-operated hand disinfectant dispensers are to be installed.

## **5. Cleaning and disinfection for F&B processing**

- 5.1 The F&B industry shall frequently wash and disinfect all contact surfaces, outer packaging and appliances for cold chain food, and reinforce the cleaning and disinfection of F&B utensils and condiment containers.
- 5.2 Disinfect surfaces of frequent contact and provide higher frequency of cleaning and disinfection for all equipment, areas, contact surfaces, points of frequent contact (such as countertops, tongs, service appliances, handles of self-service display table/door), garbage bins and sanitary ware. The frequency of the cleaning and disinfection of personnel's work clothes shall also be increased.
- 5.3 The store shall ensure that its hand-washing facilities are functioning properly and that it is equipped with quick-drying hand disinfectant. Where possible, sensor-operated hand disinfectant dispensers are to be installed.

## **6. Commonly used disinfection methods for production and operations**

Chemical and physical disinfection techniques can be used for cold chain food production, transportation and sales.

### **6.1 Physical disinfection**

Physical disinfection methods that have been validated by laboratory and actual use, and passed in evaluation by the relevant organisations, can be used to disinfect the various cold chain food production and operations.

### **6.2 Chemical disinfection**

Refer to the attached table for the commonly used disinfectants and their application methods.

### **6.3 Quality control of disinfection**

Cold chain food production companies shall employ professional disinfection personnel and be equipped with specialised equipment to disinfect cold chain food, production equipment and environment. Disinfection personnel shall be trained and certified pass before employment. Disinfection equipment shall be regularly inspected and maintained. The selection of chemical disinfectants, method of proportioning, disinfectant concentrations, ambient temperatures, action times, methods of application, matters requiring attention and evaluation of the effectiveness of

disinfection shall strictly be according to the requirements of the attached table or annex.

6.4 Regardless of using chemical or physical disinfection, every surface of the food packaging shall be thoroughly disinfected. To avoid the inconsistency of manual disinfection, automatic disinfection equipment is preferred.

Appendices:

1. Commonly used low-temperature disinfectants and their methods for cold chain food production and operations
2. Guiding principles for the evaluation of on-site low-temperature disinfection of cold chain food packaging

Appendix 1

**Commonly used low-temperature disinfectants and their methods for cold chain food production and operations**

<b>Type of disinfectant</b>	<b>Main active ingredient and formulation</b>	<b>Method of application</b>	<b>Matters requiring attention</b>
Low-temperature disinfectant, containing chlorine	Sodium dichloroisocyanurate, dual packaging, powder and liquid	1. Disinfection method: spray, soak, wipe. 2. Effective disinfectant concentration: At -18°C, effective concentration 3000mg/L, effective time 10-20min, spray about 200ml/m <sup>3</sup> . At -40°C, effective concentration 5000mg/L, effective time 10-20min, spray about 200ml/m <sup>2</sup> .	1. Low-temperature disinfectants used on-site must be legally valid. Before use, evaluation of the hygiene and safety of the disinfectant must be completed according to the Notice on the Technical Requirements for the Evaluation of the Hygiene and Safety of Low-Temperature Disinfectants, (Office of the National Health Commission (2020) No. 1062) and recorded.  2. Disinfection is to be carried out strictly according to the scope and method of application, beyond which is strictly prohibited. It is recommended to ascertain the concentrations (of disinfectant containing chlorine) before use.  3. In low-temperature mechanised disinfection, the disinfection equipment should be tested and adjusted to appropriately match the low-temperature disinfectant. Ensure that the quantity of low-temperature disinfectant fully covers six sides of the outer packaging. When used for the first time, the effectiveness of on-site disinfection shall be evaluated. The disinfectant can only be used if this passes the evaluation.
Chlorine dioxide, low-temperature disinfectant	Chlorine dioxide	1. Disinfection method: spray, wipe. 2. Effective disinfectant concentration: strictly follow the product instructions.	
Peroxides, low-temperature disinfectant	Hydrogen peroxide or peracetic acid	1. Disinfection method: spray, soak, wipe. 2. Effective disinfectant concentration: strictly follow the product instructions.	
Quaternary ammonium salts, low-	Quaternary ammonium salt	1. Disinfection method: spray, wipe.	

<p>temperature disinfectant</p>		<p>2. Effective disinfectant concentration: strictly follow the product instructions.</p>	<p>4. For low-temperature disinfection, the technical training of the disinfection staff shall be reinforced to ensure that the disinfection operation meets the standards, the quantity is sufficient and disinfection achieves full coverage.</p> <p>5. Organic matter has a greater effect on the effectiveness of disinfection. When the subject to be disinfected is severely contaminated, it should first be washed or soaked with low-temperature disinfectant. Spraying and wiping to disinfect is strictly prohibited.</p> <p>6. When preparing, packing and using low-temperature disinfectants, personal protection shall be strictly complied with, including wearing work clothes, masks and gloves to avoid contact with skin.</p> <p>7. Low-temperature disinfectants are applied externally and must not be taken orally. They should be kept out of reach of children. Immediately wash with water if the disinfectant is accidentally splashed into the eyes. Immediately seek medical attention for serious cases. Disinfectants must not come into contact with flammable materials and must be placed away from sources of fire.</p>
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## **Guiding Principles For The Evaluation Of On-Site Low-Temperature Disinfection Of Cold Chain Food Packaging**

### **1. Principles of evaluation**

The evaluation of on-site low-temperature disinfection includes process evaluation and effectiveness evaluation. Process evaluation shall be carried out for each low-temperature disinfection, which is generally self-inspected and self-evaluated by the unit that carries out the disinfection. The relevant regulatory authorities can conduct spot checks on the disinfection process as well as the self-inspection and self-evaluation processes to ensure the effectiveness of the disinfection. Generally, regular spot checks are adopted for effectiveness evaluation, which is recommended to be once every six months. When changing the low-temperature disinfection method, effectiveness evaluation of the disinfection shall be conducted. The low-temperature disinfection can only be adopted after it is proven to be effective.

### **2. Process evaluation of on-site low-temperature disinfection**

The disinfection unit that carries out the disinfection shall keep records of the disinfection and conduct self-evaluation to evaluate whether the entire disinfection operation is carried out according to the disinfection plan, whether the low-temperature disinfectant used is legal and effective, whether the disinfection method is appropriate for the items and environment to be disinfected, whether the disinfection coverage is complete, whether the quantity used meets the requirements, whether the disinfection duration is sufficient, and whether the disinfection records are according to standard requirements, etc. The content of the evaluation shall include, but not be limited to, disinfection date, disinfection location, disinfection coverage, items to be disinfected, disinfection procedure, preparation of disinfectant, concentration and quantity of disinfectant, disinfection duration, disinfection method, the use of disinfection equipment, personal protection, etc.

The low-temperature disinfectant used shall meet the requirements of the relevant national health standards and norms as well as pass the hygiene and safety evaluation. The information on the disinfectant includes its name, main active ingredients and contents, validity, preparation method, scope and method of application, etc. The information on disinfection equipment includes its name, main sterilisation factors as well as its intensity, scope and method of application, etc.

### **3. Effectiveness evaluation of on-site low-temperature disinfection**

#### **(1) Items to be evaluated and indicators**

Effectiveness evaluation of low-temperature disinfection is targeted at the surfaces to be disinfected. Select the indicator microbe according to the resistance of the COVID-

19 virus to the disinfection factors, with the microbial death rate of the indicator microbe as the evaluation indicator. The indicator microbe shall have similar or higher resistance than the COVID-19 virus, be easy to cultivate, and meet the requirements of laboratory biosafety and WS/T 683. For chemical disinfection, *Staphylococcus aureus* (ATCC 6538) and *Escherichia coli* (8099) can be selected. For physical disinfection, the selection of the indicator microbe shall meet the above requirements according to the characteristics of the disinfection factors.

## (2) Evaluation methodology

According to GB/T 38502-2020<sup>1</sup>, prepare the microbial petrifilm for the laboratory (use tryptic soy broth culture medium as organic interferents in the effectiveness evaluation of on-site low-temperature disinfection) so that the number of microbes recovered from each microbial petrifilm is  $1 \times 10^6 \sim 5 \times 10^6$  cfu per sample. Place the indicator microbe microbial petrifilm in the corresponding low-temperature environment for at least 30min and ensure that the indicator microbe reaches the same low temperature before the next step.

Before disinfection: place the microbial petrifilm on site, with the tabletops, door handles and buttons on site as the key targets with at least 2 samples for each type of surface, and their locations on cold chain food outer packaging shall be distributed on all six sides with a total of at least 30 test samples.

After disinfection: after the disinfection duration, transfer the microbial petrifilm with sterile tweezers into a test tube filled with 5.0 ml of the corresponding neutralising agent, tap it 80 times on the palm or mix evenly with a mixer, and neutralise for 10 min. At the same time, establish a positive control group.

Laboratory culture: vibrate the sample tube using the mixer for 20 s or strongly tap it 80 times, extract 1.0 ml test samples and inoculate onto sterile plates and inoculate 2 plates in parallel with each sample. Add 15ml - 18 ml of dissolved culture medium at 45°C-48°C, and shake well while pouring. After the agar has solidified, prepare culture at 36°C  $\pm$ 1°C for 48 h, count the number of microbe colonies and calculate the microbial death rate.

## (3) Results

The disinfection is considered pass when the average microbial death rate indicated on the surface is  $\geq 99.9\%$  and such samples account for  $>90\%$ .

## 4. Matters requiring attention

(1) Give consideration to the features of the location and have clarity on the subject to be disinfected. Strictly follow the standard procedures in carrying out the disinfection.

(2) The unit carrying out disinfection shall possess the capability for on-site

<sup>1</sup> Test method for bactericidal effect of disinfectant in laboratory

disinfection, and the operator shall have received professional training in disinfection and be competent in the basic knowledge of disinfection and personal protection, as well as be familiar with the use of disinfection equipment and disinfectant preparation, etc.

(3) All on-site disinfection shall be recorded and the records kept for at least 2 years, and be self-monitored. The effectiveness evaluation of disinfection shall adhere to standard operations. Samples and related test materials shall be decontaminated strictly according to biosafety requirements.

(4) Personal protection shall be carried out during on-site disinfection, and the proper and effective personal protective equipment shall be selected according to site conditions and relevant standards.

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