Alcoholic and Non Alcoholic Beverage Processing Level – II

Based on October 2019, Version 2 Occupational standards

Module Title: Working in Temperature Controlled Stock

LG Code: IND ANB2 M14 LO (1-3) LG (51-53)

TTLM Code: IND ANB2 TTLM 0920v1

September, 2

Bishoftu, Ethiopia

United Nations
Educational, Scientific and
Cultural Organization

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LG #51	LO #1- Store stock to meet temperature control requirements

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Identifying goods requiring temperature control
- Locating goods in correct storage areas
- Recording Stores information
- Confirming Service
- Checking and adjusting equipment performance

This guide will also assist you to attain the learning outcomes stated in the cover page.

Specifically, upon completion of this learning guide, you will be able to:

- Identifying goods requiring temperature control
- Locating goods in correct storage areas
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Learning Instructions:

Read the specific objectives of this Learning Guide.

1. Follow the instructions described below.
2. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
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Information Sheet1-identifying goods requiring temperature control and Locating good correct storage areas

1.1 Introduction

The traditional definition of “perishable foods” has been revised over the years to reflect scientific and technological developments. “Perishable foods” broadly emphasizes the idea that food such as raw meat or produce eventually spoils, but without any connotation regarding safety. Once the number and severity of food recalls due to foodborne illness became more common as a public health issue, perishable foods were redefined as “potentially hazardous foods” (PHF) to acknowledge the new concerns.

Most recently “PHF” has undergone yet another transformation. Increasingly, the new term used is “TCS,” or foods requiring time and temperature control for safety. This change emphasizes not merely the potential existence of unsafe pathogens, but the two primary ways to control contamination in the first place—that is, the solution rather than merely the problem. Several factors affect the rate at which pathogens grow in food, but time and temperature are two of the most easily-controlled factors along the supply chain. “TCS” thus reflects the shift from reactive to proactive approaches to food safety initiated by passage of Food Safety Modernization Act (FSMA).

There are six factors that affect bacterial growth in food: time, temperature, moisture, acidity, nutrients, and oxygen. TCS foods are the most likely to be affected by all six factors, and thus are most at risk for bacterial growth. Small amounts of pathogens in TCS food are typically not a problem, but too many can cause foodborne illness. Add time and warmth to the mix, and these foods can become bacteria breeding grounds.

Bacteria tend to grow in foods with a pH between 4.6 and 9.0. Low pH foods are more acidic, and include pickles, jam, honey, and fruit. High pH foods lack acidity and include meat, milk, and vegetables.

Bacteria need moisture to grow, which is measured by water activity. The higher the moisture in a food, the better the conditions for bacterial growth. The water activity scale

ranges from 0 to 1.0, with distilled water being 1.0. Most foods have a water activity of at least 0.95, meaning that bacteria have sufficient moisture to grow.

A food handler cannot control a food's acidity or moisture; these properties are inherent to the food itself. However, along the food supply chain, the remaining two factors, time and temperature, can be controlled.

1.2 Identifying goods

The need for time/temperature control is primarily determined by the potential for pathogenic contamination and the subsequent growth of microorganisms.

The following factors must always be considered when determining whether a food requires time/temperature control during storage, distribution, and handling to assure consumer protection:

- The kind and number of initial microorganisms present.
- The composition of the food (moisture, pH, acidity, nutrient content)
- The processing methods (heating, cooling, thawing, holding)

Based on the above criteria goods requiring temperature control environment are:

- wine
- malt
- grain
- grape
- Pepsi
- coca cola

Information Sheet2 - Locating good in correct storage areas

2.1 Locating goods

Storage of food has special importance due to the need to maintain the safety of the food. There are 3 basic food storage methods:

- Dry goods storage
- Refrigerated goods storage
- Frozen goods storage

As general requirements in relation to food storage safe food handling requirements include:

- Use food grade materials to store food susceptible to contamination – stainless steel is preferred
- Cover food to protect it from contamination
- Rotate stock to ensure it is used in the correct sequence
- Keep all storage areas and equipment clean
- Never store food (including packaged food) directly on the floor. Put cartons on pallets, shelves, trolleys or in „bins"
- Ensure pests and rodents are excluded from food storage areas. Conduct a regular (at least weekly) inspection to check this, and take appropriate action when evidence of pests or rodents is discovered.

Procedures for maximizing the shelf life of stored beverages divided into two categories:

- Those dealing with temperature, humidity and light in the storage areas.
- Those dealing with the manner in which bottles and other containers are handled and stored.

2.1.1 Temperature, humidity and Light in Storage Facilities

For every beverage product, there is a temperature range appropriate for storage that will tend to preserve quality and shelf life. For some, the range is extremely broad; for others, it is very limited. Spirits, for example, can be stored indefinitely at normal room

temperatures without harming product quality. If necessary, they can be stored well above or well below room temperatures for considerable periods. As long as the storage temperature does not become extreme, they will not suffer loss of quality. In contrast, carefully controlled storage temperatures are critical for maintaining the quality of beers and wines

2.1.2 Storing and handling Bottles and Other Containers

Spirits can be stored upright on horizontal shelves for unlimited periods. In contrast, wines and other corked beverages cannot safely be stored in an upright position. If they are to be kept for any length of time, they must be stored on their sides, parallel to the floor.

There are special racks designed to store wines in the proper position. In this horizontal position, the beverage in the bottle is kept in constant contact with the cork, helping to keep the cork moist and thus keeping the bottle tightly sealed.

When it comes to storing non-alcoholic beverages, a temperature is of the utmost importance. Another thing that should be taken care of is the place where the drinks are kept. It is recommended that soft drinks are kept in tightly sealed containers and in the dark.

2.1.2.1 Wine Storage Temperatures

The ideal storage temperature for wine is 55 degrees Fahrenheit. However, the various types of wine can have different optimal temperatures. The proper storage temperatures

- white wine:
    - ✓ Sparkling: 40 to 45 degrees Fahrenheit
    - ✓ Light bodied or sweet: 45 to 55 degrees Fahrenheit
    - ✓ Full bodied: 50 to 55 degrees Fahrenheit
- red wine:
    - ✓ Light bodied: 50 to 55 degrees Fahrenheit
    - ✓ Medium bodied: 55 to 60 degrees Fahrenheit
    - ✓ Full bodied: 60 to 65 degrees Fahrenheit

Fig1.1 cellar wine stock

Fig 1.2 wine in refrigerator

2.1.2.2 soft drinks storage

Most soft drinks should be stored at a temperature of at least 2° C and not more than 12 ° C. The exception is concentrated drinks, which can be stored for a wide range of temperatures from 0 to 20 ° C; such drinks as Coca-Cola, Pepsi-Cola, Fanta can stand from 2 to 25 ° C. When storing, it is important that there are no sudden temperature changes causing condensation on the package.

Thus, it is absolutely not necessary to stuff everything into refrigerator. However, there are drinks that lose their taste in warmth, and for others, the cold is contraindicated.

The bubbles in the sodas give people a refreshing feeling, and the low temperature helps to enhance this taste. This is exemplified by the advertisements of Coca-Cola and Pepsi filled on the surface of refrigerators in supermarkets and convenience stores.

Table1 :Beverage storage temperature

Beverage	Temperature
Non alcoholic	
Pepsi	5.6˚C (42˚F)
Coca-Cola	3.3˚C (38˚F)
Alcoholic beverage	
Whiskey	15˚C (59˚F)
Vodka	7˚C (44.6˚F)
Red wine	16˚C-18˚C (60.8˚F-64.4˚F)
White wine	10˚C-12˚C (50˚F-53.6˚F)
Rose:	10˚C (50˚F)
Champagne, Sparkling wine	8˚C-10˚C (46.4˚F-50˚F)

Fig 1.3 soft drinks stock

2.1.3 Malt storage

Store in a temperate, low humidity, pest free environment at temperatures of <90 ºF. Improperly stored malts are prone to loss of freshness and flavor. Whole Kernel Diastatic and Preground Malts are best when used within 6 months from date of manufacture. Whole Kernel Roasted Malts may begin experiencing a slight flavor loss after 18 months.

Freezing dry malt will not harm the kernels, but we do not recommend it due mainly to condensation forming after it thaws. Malt that undergoes freeze/dry cycles will actually decrease in moisture. In addition, storing malt outdoors, even in moisture resistant containers is not recommended.

Fig 1.4 malt silo

Information Sheet 2- Recording stores information

Stock means all the products that an industry has for sale. Everything used to make products, provide services and to run business is part of your stock.

There are four main types of stock:

- Raw materials and components - ready to use in production
- Work in progress - stocks of unfinished goods in production
- Finished goods ready for sale
- Consumables - for example, fuel and stationery

Producers keep stock records for raw materials, for finished products ,consumables and finished good

Stock records

Keeping stock records means writing down:

- all stock that comes into storage, and
- all stock that goes out of the store

Stock records are useful because they show

- what goods or materials used
- how much of the goods or materials used
- when the goods or materials were used
- how much of the goods or materials are available in stock

Advantage of stock records

- what stock distributed fast
- what stock(raw material) to order
- when to re-order
- how much to produce
- if any stock is missing

Information sheet 3-confirming available services

3 Confirming services ready for operation.

It covers basic service preparation such as inspecting and operating simple preparation equipment. Method used to confirm on materials and specification requirements include:

- Confirming type of materials
- Visual inspection
- Sorting and grading
- Equipment preparation

3.1 Power source: refers to the electricity used in driving cold rooms, refrigerator and related equipment.

Refrigerator

The fundamental reason for having a refrigerator is to keep beverage cold. Cold temperatures help food and beverage stay fresh longer. The basic idea behind refrigeration is to slow down the activity of bacteria (which all food and beverage contains) so that it takes longer for the bacteria to spoil the food.

For example, bacteria will spoil milk in two or three hours if the milk is left out on the kitchen counter at room temperature. However, by reducing the temperature of the milk, it will stay fresh for a week or two -- the cold temperature inside the refrigerator decreases the activity of the bacteria that much. By freezing the milk you can stop the bacteria altogether, and the milk can last for months (until effects like freezer burn begin to spoil the milk in non-bacterial ways).

Glycol Cooling Units

Glycol Cooling Units are secondary self-contained refrigeration units that circulate a water and a food grade anti-freeze (glycol) coolant through an insulated beer line bundle creating contact refrigeration between the coolant and product lines. The secondary refrigeration unit is only designed to maintain the product temperature from the time it leaves the barrel storage area until it arrives at the point of dispense.

Custom Beverage recommends glycol cooling for remote draft beer systems. These self-contained refrigeration units cool a bath of glycol to a temperature of between 28 – 31 Degrees Fahrenheit. Then a circulator pump on the unit will move the cold fluid through the beer lines to create contact refrigeration with the product lines in the beer line bundle. The refrigeration will cycle on and off per a thermostat sensing the bath temperature, while the circulation pump runs 24/7 to create the most consistent bundle temperature possible.

Compressed air

Compressed air is a gas, or a combination of gases, that has been put under greater pressure than the air in the general environment. Compressed air has a great deal of potential as a clean, inexpensive, and infinitely renewable energy source. Its use is currently being explored as an alternative to fossil fuels.

Cold Room

Cold room (also called cool room, chiller room) is a walk-in storage facility in controlled condition to keep a consistent temperature, it is widely used to preserve the quality of stored beverages product.

Fig 1.5 cold room

Information Sheet 4– checking and adjusting equipment performance

Temperature controlling device

A temperature controller is a device used to hold a desired temperature at a specified value.

This can be in a situation where food and beverages are required to be heated, cooled or both and to remain at the target temperature (set point), regardless of the changing environment around it.

Temperature controllers used in ovens are best example to demonstrate how temperature controllers work. When a temperature is set for an oven, a controller monitors the actual temperature inside of the oven. If it falls below the set temperature, it sends a signal to activate the heater to raise the temperature back to the set point. Thermostats are also used in refrigerators. So if the temperature gets too high, a controller initiates an action to bring the temperature down.

Temperature controllers in industry work much the same way they do in common household applications. A basic temperature controller provides control of industrial or laboratory heating and cooling processes. In a typical application, sensors measure the actual temperature. This sensed temperature is constantly compared to a user set point. When the actual temperature deviates from the set point, the controller generates an output signal to activate other temperature regulating devices such as heating elements or refrigeration components to bring the temperature back to the set point.

Air-conditioners, space-heaters, refrigerators, water-heaters, etc. are examples of devices that perform temperature control. These are often broadly classified as Thermostatically Controlled Loads (TCLs).

4.1 Parts of a Temperature Controller

Temperature controller have inputs. The inputs are used to measure temperature variable in the process being controlled.

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A controller will typically incorporate a feature to detect when an input sensor is faulty or absent. This is known as a sensor break detect. Undetected, this fault condition could cause significant damage to the equipment being controlled. This feature enables the controller to stop the process immediately if a sensor break condition is detected.

4.1.1 Outputs

In addition to inputs, every controller also has an output. Each output can be used to do several things including control a process (such as turning on a heating or cooling source), initiate an alarm, or to retransmit the process value to a programmable logic controller (PLC) or recorder.

4.1.2 Other Parameters

Temperature controllers have several other parameters, one of which is a set point. Basically, a set point is a target value set by an operator which the

controller aims at keeping steady. For instance, a set point temperature of 30°C means that a controller will aim to keep the temperature at this value.

Another parameter is an alarm value. This is used to indicate when a process has reached some given condition. There are several variations on types of alarms. For instance, a high alarm may indicate that a temperature has gotten hotter than some set value. Likewise, a low alarm indicates the temperature has dropped below some set value.

4.3 Adjusting Refrigerator Temperature

Rather than trying to interpret arbitrary numbers on the adjustment dials in your fridge, recommends investing in a refrigerator thermometer. This device is designed to work accurately and effectively at the low temperatures found in the average refrigerator and freezer. Place the thermometer in a glass of water, then position the glass in the center of your fridge. Check the temperature after five to eight hours. If it is higher than 40 degrees, adjust the baffle knob to allow more cold air into your fridge and reduce the temperature. If it is lower than 38 degrees, turn the baffle knob the opposite way to restrict the flow of cold air from the freezer to the fridge. Once you've reached a range of 38 to 40 degrees F in your refrigerator, place the thermometer between packages of frozen food in your freezer, then wait five to eight hours. If the temperature is below 0 degrees F, turn the temperature knob up. If it's higher than 2 degrees F, turn the temperature knob down to lower the temperature.

Table 2: refrigerator adjustment

Condition	Adjustment
Refrigerator too cold	Refrigerator setting One setting higher
Refrigerator too warm	Refrigerator setting One setting lower

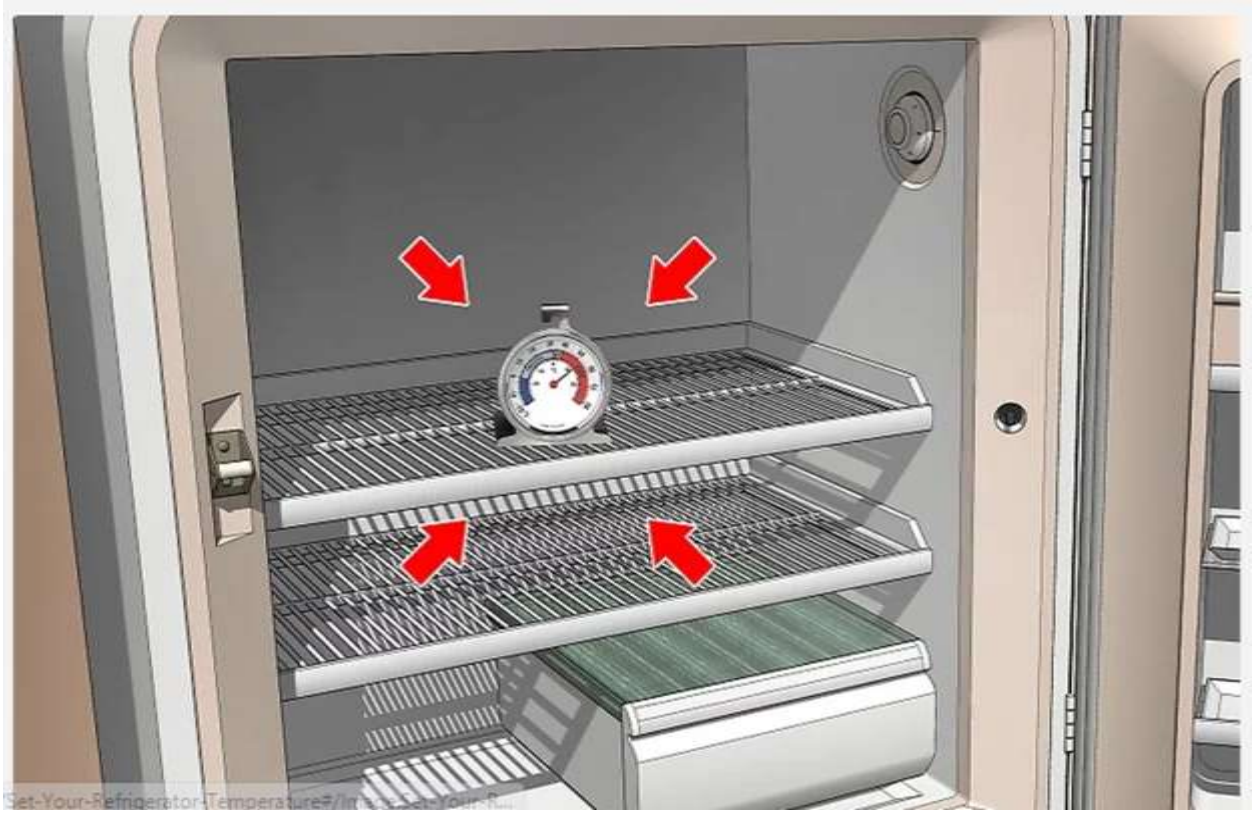

Fig1.6 measuring temperature of refrigerator

Fig 1.7 adjusting refrigerator

LG#52	LO #2- Monitor and maintain temperature of stock within specifications

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Monitoring stock temperature
- Monitoring storage areas temperature
- Monitoring residence time in temperature controlled stores
- Identifying and taking corrective action of storage temperatures

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Information Sheet 1 – Monitoring stock and storage areas temperature

Introduction

Always stock on hand need to be monitored. It may be required to keep an eye on quantities to determine the amount of the next product but also it is definitely expected to check on stock quality while it is in storage. It should become second responsibility to check all stock is up to the standard expected by the industry. Constant checking for quality is useful because the sooner any problem is detected, the better. If a problem is noticed, take appropriate action to fix things or immediately report any situation to your supervisor.

Monitoring needs to be an on-going activity Stock can be checked for quality at the same time you perform the following:

- Placing new items into stock
- Checking use-by/best before dates
- Taking items out of storage for issuing to departments
- Doing stock takes
- Performing pest control activities such as laying baits, or pest control bombs
- Cleaning and tidying tasks in the stores area.

1.2 Inspection practices

The process of inspecting stock and storage areas must include the following practices:

Undertaking visual inspections. All inspections require you to look at:

- Floors, walls and ceilings
- Shelves, bins and storage containers
- Individual stock items
- Stock and storage area temperature

1.3 Temperature monitoring techniques

The temperature of the stock as well as the storage area need to monitor. In this monitoring the following techniques are used

- Prepare/calibrate temperature measuring instrument
- Measure the stock temperature
- Measure the storage area temperature
- Compare the result with the standard temperature of the stock and storage area

1.3.1 Types of thermometer

Temperature is a physical quantity which is defined as the hotness or coldness of any object or substance. We can calibrate temperature in different scales and in different units according to our requirements. Kelvin (k) is the international system of units (SI) of temperature, other than Kelvin temperature is measured in Celsius scale (C) and Fahrenheit scale (F). We can easily convert one unit of temperature into another by using some calculations. For measuring temperature we use different methods and devices. Till now many methods have been developed for measuring temperature. Almost all the methods depend upon the measuring some physical property of a working material that varies with temperature. Following are the most commonly used temperature measuring devices.

- Liquid in Glass Thermometer
- Electric Resistance Thermometer
- Radiation Thermometry
- Thermocouple
- Bimetallic Devices
- Bulb and Capillary Sensor
- Constant volume Gas Thermometer
- Sealed Bellows
- Constant Pressure Gas Thermometer

Among the above thermometers the most important are explained below

Liquid in Glass Thermometer

It is the most common type of temperature measuring device. We all are aware of it and use it many times for measuring our body temperature in case of fever. As name suggests this device consists of a small diameter glass tube containing some liquid. The most commonly used liquid is mercury. But due to some hazardous effect of mercury, other fluids for example organic liquid or some alcohol which are less toxic replaced

mercury. The liquid is chosen in such a way that it expands quickly as per slight change in temperature. Thermal expansion of liquid takes place into the thermometer. The volume of the liquid changes with change in the temperature. The small change in the volume drives the mercury column relatively long way. The space in the glass tube is filled with nitrogen or partial vacuum. A scale is marked on the periphery of the thermometer to measure the temperature as liquid expands. The scale is calibrated properly according to the temperature variation. The accuracy of this type of thermometer is based on the manufacturing process. It can measure only limited range of temperature. It is cheap and easy to use and no power source is required

Application

1. It is mostly used in hospitals and homes for measuring body temperature.
2. In air craft application to measure the atmosphere condition which is suitable for flight.
3. It is used in meteorological and oceanographic applications. It helps to measure weather forecast models.

Fig1.7 Glass thermometer

Electric resistance thermometer

Electric resistance thermometer was developed after the liquid in glass type thermometer. In this, the change in the resistance of a metal wire due to change in the

temperature is measured. When electric current flows through the wire then the wires scatter of each other due to the electric resistance. The wires used are of platinum because platinum do not react with air and due to its non-corrosive property. These wires are normally wound into a coil and placed in a ceramic tube or they may be attached like wheat stone bridge circuit.

Fig 1.8 Electric resistance thermometer

Application

1. It can measure temperature to a higher degree of accuracy
2. It is very sensitive so that a small change in the temperature can be measured.
3. It is mostly used for calibrations of other thermometers due to its higher degree of accuracy and sensitivity.

Radiation thermometer

It is based upon the radiation emitted by the body. All the objects emit infrared radiations with intensity proportional to its temperature. These radiations detect by radiation detector known as radiation thermometers. Radiation thermometer consists of a number of series of optics that focus infrared lights onto a special electronic detector. This electronic detector is made up of semiconductor material. Semiconductor materials produce electric current which is directly proportional to the intensity of infrared radiation. This device has electronics circuit so we can say that this device measure temperature electronically.

Application:

1. It is used to measure the temperature without any physical contact.

2. It is helpful to measure temperature of objects which are at some distance.
3. Radiation thermometers measure temperature at very faster rate. So it is used where quick results are required

Fig1.9 Radiation /infrared thermometer

Bimetallic thermometer

As per the name of this device the temperature is measured by the means of bimetal i.e. two metals inside the temperature sensor. It is made up of two metals strips having different thermal expansion coefficient. This device works due to the expansion of metals when they are heated. These metals bonded together and mechanically linked to a pointer. When they are heated one side of the bimetallic strip will expand more than the second one. This expansion shows by the pointer of this device which is calibrated according to the proper temperature range. In some practical situations the bimetallic system consists of a bimetallic strip which can be helical or spirally wounded depends on the size of the sensor and the temperature range to be measured. When the temperature variation takes place the bimetallic rotate an attached spindle which is indicated by the pointer attached to it. This device can measure temperature from -80^{o}C to +600^{o}C. So that we can easily use it to measure high temperatures. The main advantage of this device is, it does not use any power source for their operation. But these are not so accurate like electrical devices such as thermocouple.

Application:

1. It is most commonly used in household thermostats.
2. The other main application of bimetallic device is in circuit breakers.

Fig1.10 Bimetallic thermometer(device)

For a large number of industries and applications, monitoring of cold storage is an absolute necessity.

1.3.2 Temperature Monitoring

Whatever the particular quality standards or codes of compliance relevant to your industry, an effective temperature monitoring program should be able to answer these

There are four options for monitoring fridge/freezer temperatures:

- Manual thermometers
- Chart recorders
- Data Loggers
- Wireless internet of devices (IoT)devices

Manual Thermometers

Thermometers have been utilized for centuries and are the simplest technique through which to monitor fridge and freezer temperatures. Usually, a technician or other team member attends to each fridge or freezer a minimum of two times per day and logs the reading from a thermometer tracking the internal temperature.

Fig 1.11 manual thermometer

The readings are noted in a logbook by hand and can be stored for record keeping. Although the task of taking and recording the temperature measurement is a simple one, other drawbacks can make this technique a less suitable option

While the upfront outlay for a thermometer is low, it is important not to forget the personnel costs of paying employees to measure and record this information on a daily basis. If a number of cold storage facilities are being monitored, this task could take up several hours each day, which could add up to a high cost of operation.

Furthermore, while storing log sheets for record keeping is entirely feasible, this method is the most vulnerable to human error. The reliability of data logged can be affected by factors as simple as whether the instruments are positioned in a manner that allows for easy reading, or whether the lighting in each area is adequate to view the instruments clearly.

Finally, manual recordings have lower levels of reliability than other types, as they could easily be tampered with in the instance of a regulatory or liability action.

Pros

The advantages of these simple instruments are their low capital costs, their ease of use and their well-established history.

Cons

The drawbacks of this methods are the high labor costs, the burdensome record keeping and the risk of human error. It should also be noted that this method does not allow for continuous monitoring, nor can it raise alarms in real-time should a problem occur.

Chart Recorders

For continuous recording of fridge and freezer temperatures, chart recorders are a reliable, relatively low-cost and simple to manage method that has been employed for decades.

Fig 1.12 chart recorder

It is possible to save and file the charts to create a thorough record of temperature. With these advantages, chart recorders have become a common method for monitoring cold storage.

However, despite their reliability and simplicity, chart recorders still create a need for a member of staff to change the chart paper, typically once a day or once a week, and to

store the chart safely for compliance. For greater resolution into subtle temperature differentials, a larger chart recorder will be required.

A further factor for consideration is the cost of operation. Both charts and pens need to be replaced regularly, and if dozens of these are in use, the expenditure on paper charts and pens can start to pile up. Storage of the used charts can also become an issue as they are accumulated over time.

Pros

The advantages of chart records are that they are simple to use, require an uncomplicated form of data storage, and can offer continuous monitoring.

Cons

The downsides of this method are that it can incur relatively high operating costs over time, and the method of record keeping is cumbersome. The data has poor granularity and there is no capacity for real-time alarms or notifications in the event of an issue.

Data Loggers

Data Loggers are instruments that measure and save temperature readings electronically. They offer continuous monitoring of freezer/fridge temperatures and can alarm when temperatures are out of specification.

Fig 1.13 Data Loggers

Data loggers are more expensive than manual thermometers, but they offer the advantages of continuous monitoring and storage of data. They can also be set up to alarm for out of range temperatures. The data saved by a data logger can typically be downloaded and stored using a USB memory device, or they can be connected to a local area network.

Data loggers store a lot of information that can be easily saved and retrieved for regulatory compliance. What data loggers typically aren't set up to do is to alarm users remotely for out of temperature conditions. They also are typically not set up to make data available in the cloud for easy access.

Pros

- Continuous monitoring
- Data storage is straightforward
- Relatively simple

Cons

- No remote alarming and notification
- Data typically not available in the cloud

Wireless IoT monitoring and alarming

With no wires or connections required, wireless IoT monitoring is simple to set up. Each element runs on battery power and is able to connect directly to the internet, and to a bespoke data portal in the cloud. With the portal, the user can monitor equipment in real-time as well as receive immediate email or SMS alerts for out of spec temperatures.

This method circumvents the risk of human error, is able to store data for lengthy periods, continuously monitors equipment and immediately alerts users when out of spec conditions are detected.

Data is stored securely in the cloud and is simple to access for regulatory requirements. Where battery power is low or connectivity issues occur, users receive alerts, ensuring no data is lost.

Fig 1.14 IoT monitoring

Pros

The advantages of wireless Lot monitoring are that it is simple to install, offers continuous monitoring with cloud storage of data and that it offers alerts for out of spec conditions.

Cons

The downside of the method is that initial setup costs are slightly higher than with other methods.

1.3.3 Cold Room / Warehouse Monitoring

A various warehouse used for storing raw material and beverage have temperature and humidity controlled environments. In order to ensure the storage conditions, it is essential to record and monitor the temperature and humidity inside the warehouse.

emperature and Humidity Monitoring with Alert for Cold Room, Walk in Chillers, Warehouses etc.

Real-time monitoring solutions which will continuously monitor temperature and humidity of the area. The device will continuously record the data on itself, on a computer as well as over the internet.

Typical applications of a real-time temperature monitoring system

- Recording and monitoring of Cold Storage used for food, meat etc.
- Recording with monitoring of temperature along with alerts for walk-in Chillers or Walk-in freezers for food or medicines.
- use the same for monitoring and alert system for power failure.

Temperature & Humidity Monitoring Solution

The recording and monitoring system will work automatically and will also generate Email/SMS/Voice call alerts for alert conditions. Main Features of such a system are:

- Fully standalone with battery backup and will work even in the case of power failure.
- Are recorders and transmitters which transmit data by various modes such as Wi-Fi, Radio Frequency, etc.
- They will work even without the need for a computer network.
- Recording happens on the device, on a local server and on the internet.
- Graph and chart display is available on the device or on a computer.
- The system can send a daily or weekly email summary report to a user.
- Connect multiple locations to a single software for centralized software.
- Each sensor have different alert levels as per requirement.
- The device has with its own free software which will display the readings in a graph form continuously.

Sampling interval

The sampling interval is the frequency of data collection. eg. If we record the temperature every 10 seconds, it means that the sampling interval is 10 seconds. Also,

we can program the higher and lower limits of the Temperature & Humidity and the delay duration on the device. If the parameters exceed these limits for the defined duration, it will make phone calls to 10 operators until one of them attends the call. Upon attending the call, it delivers a recorded voice message indicating the type and location of the fault. You may consider the following points.

- For a narrow range of temperature, a lower sampling rate is required. eg. for a cold room of 2-8 °C, a sampling rate of 3 minutes may be required whereas for a warehouse of 15-25°C a sampling interval of 10 minutes may be sufficient.
- Another criterion is permitted excursion period. eg. you do not want the temperature to go above 8°C for more than 1 minute. Hence, you have to select a sampling interval of 60 seconds or less. The logic is that you need to monitor the temperature very closely.
- For cold storage of -20°C, a sampling interval of 15 or 20minutes also may be sufficient.

Graph 1.1 Real time temperature monitoring

Number and locations of temperature sensors

In a huge warehouse or cold room, it is difficult to decide the ideal locations to be monitored. The sensors for monitoring has to be placed to monitor and record the data. In order to decide the locations and number of sensors, the following guidelines may be followed:

1. Ideally, a temperature mapping study has to be carried to find out the temperature distribution.
2. Find out the hottest and coldest points of the area
3. Find out all other hot and cold points
4. Mark up the layout drawing of the area to indicate these points(see fig 1.15)

5. All of the above points need to be monitored since these are critical points
6. From the locations thus defined, if any huge area is left out one or two sensors should be distributed in such area.
7. Typically for a warehouse of 3000 sq. meters and a height of 10 meters having ideal temperature distribution, approximately 10 sensors will be required.

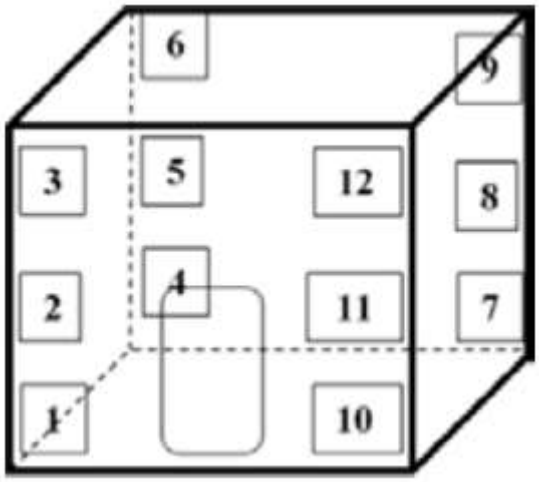

Fig 1.15 marking layout area

Temperature Monitoring Software

The software continuously collects readings from the data loggers for the whole warehouse or cold room as installed. The software carries out the following functions.

- Configuring the alert conditions for each sensor separately.
- It will send email alerts upon alert conditions.
- It displays Graphs, Charts for multiple devices and locations.
- We can see different devices on a single screen.
- It sends the summary of readings to 4 Email ids at regular intervals (1 hour to 24 hours can be programmed).
- We can configure an FTP service for uploading the data at regular intervals.
- Through the software, we can configure the sampling interval.
- A phone call, SMS and Email alert system for temperature monitoring systems

Fig 1.16 phone call, email, SMS alert system

- Apart from over-temperature & humidity alerts, various other critical parameters to the same voice call alert system connected .This alert system operates using a SIM card and hence local phone connection is not required. Critical parameters which can be monitored include:
  - ✓ Compressor failure alert to monitor whether the compressor of the cooling units fails.
  - ✓ Power Failure Alert to generate a phone call in case the power supply fails.
  - ✓ Door Open Alert which can generate if the door of a refrigerator or cold room remains open for a certain duration.
  - ✓ Water Leakage detection generating an alert if there is water leakage.
  - ✓ Gas Leakage alert to generate a phone call or SMS alert in case of a gas leak.
  - ✓ Smoke alert generating a phone call or SMS alert in case of smoke or fire.

Information -2 - Monitoring residence time in temperature controlled stores

Monitoring residence time

Time alone strategy is prone to human error and thus is a riskier form of food safety control. Time in combination with temperature offers a much more accurate and reliable approach.

Fluctuation of temperature readily occurs during storage, transport and retail display, thus greatly impacting the growth of microorganisms.

2.1Liquor

There are three main factors that can affect the quality of liquor over time:

- light,
- temperature
- air

When liquor is exposed to daylight over a long period of time, it can lose colors. For liquor, color changes are indicative of flavor changes. Similar to that, temperature changes can degrade an organic molecule called "terpene," which alters the liquor's flavor. Lastly, air exposure can lead to oxidation of liquor that affects its flavor. If hard liquor stored in moderate temperature away from direct light, it lasts indefinitely. At 30% to 40%, liquor is not a hospitable environment for bacteria. And if it's not opened, you'll deal with virtually no oxidation.

But once you open a liquor bottle, oxidation begins. That's why most hard liquors will "go bad" within a year or two.

Most primary (also called "base") liquors like whiskey, brandy, rum, gin, tequila, and vodka, have an almost infinite shelf life if left unopened. That's because they don't have much sugar and, unopened, aren't at risk of any oxidation. The high alcohol content also makes them particularly inhospitable to bacteria life.

Once you open bottles liquors tend to lose certain flavor qualities over a few years. But they won't spoil.

An important thing to note is that the less liquor in an opened bottle of liquor, the quicker the alcohol expires. That's because there is more oxygen-rich air in the bottle, which hastens oxidation and degradation.

Vodka: Vodka, a liquor usually made from fermented grains and potatoes, has a standard alcohol concentration of 40% ABV in the United States.

Vodka really doesn't go bad. If the bottle stays unopened, vodka shelf life is decades. So, effectively, vodka doesn't expire. Vodka is a simple, stable spirit. Vodka doesn't expire, but it wouldn't literally last forever.

Once opened, not a whole lot changes, surprisingly. Vodka is a durable spirit. The shelf life of opened vodka is around 10 to 20 years. Having opened the bottle, the seal will be weaker and the oxidation more rapid. Rapid, relatively. We're still talking about decades before the vodka expires, which is why we say not a whole lot changes.

Whiskey: Whiskey is a spirit made from fermented grain. The ABV of whiskey ranges from 40% to 50%.

Unopened whiskey doesn't expired Whiskey that hasn't been opened lasts indefinitely. Most whiskey scientists believe that an opened bottle of whiskey lasts about 1 to 2 year if it's half full. Whiskey expires about 6 months if it's a quarter or less full. That's because the less whiskey in the bottle, the more oxygen. And the more oxygen, the quicker the oxidization and the quicker the whiskey can go bad.

Tequila

Tequila doesn't expire if left unopened, like the other shelf-stable spirits. But tequila can go bad. Once opened, tequila should be enjoyed within a year. That's how long tequila lasts.

Gin

Gin is a spirit made from juniper berries. It can have anywhere from 35% to 55% ABV Brand.

Gin can go bad if not enjoyed within about a year of opening the bottle. If kept sealed, a bottle of gin can last indefinitely if stored out of direct sunlight in non-extreme temperatures. Unlike vodka, gin depends on the subtle flavors of botanicals. That means that gin has a lot more to lose when it comes to flavor degradation. That's why the open-bottled shelf life of gin is a fraction of vodka, yet they're both clear liquors.

Brandy

Brandy is distilled wine. The concentration of alcohol in brandy ranges from 35% to 60%. For example, one famous brandy, Cognac, has 40% ABV.

Brandy, unopened, does not go bad if kept away from heat and light. Once a bottle of brandy is opened, it's got about 1 to 2 years left before noticeable degradation in flavor and quality.

Wine

Wine can go bad but there are many factors that play into how bad it goes and when it goes bad. Wine storage conditions, the type of wine, if it's been opened, and how long it's stored.

Generally speaking, red wine at the store will last about 2–3 years unopened. Likewise, unopened white wine of similar quality lasts around 1–2 years.

When you get into fine wines that are meant to be aged, they can last for decades unopened. Both reds and whites, though bigger-bodied wines and red wines tend to age better.

Beer

Beer expired fast than the above alcohols. That doesn't mean it becomes unsafe to drink, though. It means that the flavor and quality are so degraded that it's probably not worth knocking back

At room temperature, beer lasts about 5 to 9 months. In a refrigerator, beer can last up to two or three years. This applies to bottled beer and cans, Unopened, of course. Opened beer has a shelf life of about a day. Thankfully, you can easily tell if your bottled beer has gone bad. Most beers have expiration dates printed on them or their package.

2.1.1 Effect of light and color on alcoholic beverage

When hard alcohol "goes bad," it loses its color and its taste becomes duller. There are two primary causes of alcohol losing its color and flavor. They are light and air. We'll also cover heat, because whether heat affects alcohol is a common question.

Light

Light, and specifically sunlight, affects the molecules within liquor bottles. It breaks down and changes the liquor's organic compounds. This mostly affects the color of the

liquor, but it does have ramifications regarding the taste. In that, like the color, the taste can dull.

Air

Oxidation. Once opened, bottles of alcohol and liquor are no longer fully sealed and are subject to degradation by air exposure. Specifically the oxygen within the air. Once a liquor begins oxidation, it can take years for the alcohol molecules to break down. But once they do, they taste more acidic and tart.

Alcohol is created in high temperatures and remains relatively shelf stable in temperatures beyond the most extreme. There's little danger in storing alcohol in consistently hot, by human standards, temperatures.

2.2 Soft drinks

If the bottle is damaged or leaky, discard the drink. Same thing if the can is bulging or severely dented. Or if it started rusting.

If everything about the can or bottle seems to be okay, the liquid inside should be fine too.

Once you open the drink that's months past the date on the label, look for typical signs of spoilage, like an off odor, or changed color. Chances of that happening are slim to none, but hey, it's always better to check.

If everything with the liquid seems to be okay, give it a taste to find out if it's good enough to drink. If it's flat or just doesn't taste that great, it's probably best to pour it down the drain.

Beverage storage areas for alcoholic and non-alcoholic products which includes:

- Refrigerators
- Cool rooms
- Dry goods store
- Cellars

Information sheet3-Identifing out-of-specification storage temperatures and taking corrective action

Identifying out of specification

Proper stock inventory of the expired food items must be done regularly to prevent inadvertent use. The documented quantity of all expired items must be equal to the actual count of the stock in the non-conforming products area. Expired items must be discarded or disposed immediately whenever possible, within 72 hours after the date of notification.

Identifying stock approaching use-by best-before date so it can be used,

- Adhering to internal inspection protocols. Some have:
  - ✓ Inspection schedules detailing when to inspect and what items or areas to inspect
  - ✓ Inspection checklists. These identify aspects of items or areas to inspect and provide tick boxes to be checked after inspection and include a section for writing down problems identified for later follow up action
- Checking stock quality. This is a constant requirement for every inspection and a part of handling item in storage
- Checking for signs of pest infestation. Look for:
  - ✓ Signs of physical damage to the storage area itself
  - ✓ Damage or degradation of stock items
  - ✓ Evidence of the presence of vermin such as cobwebs and/or droppings
- Ensuring stock is aligned with designated storage areas – making sure stock is placed where it should be.

Follow-up action

If your inspections determine items need to be thrown out, make sure you complete the necessary internal paperwork to notify management what has happened to the items.

This allows them to factor in this loss to their calculations of departmental financial performances, and may:

Allow them to initiate some claim for the products lost against insurance or suppliers
Indicate to them a need for training or a revision to SOPs to prevent a recurrence of the problem.

When you need to dispose of stock of unacceptable quality you should also:
Notify the person/department using those items so they can decide if more stock needs to be ordered. Never just throw stock out without notifying anyone
Consider if the stock can be converted for use somewhere else in the property to prevent the organization suffering a total loss. For example, note paper intended for guest use may become degraded in storage to the extent it cannot be presented in in-room compendiums but they may still be perfectly acceptable as note pads for staff use.

Take remedial action where stock related issues are identified

Introduction

Where you identify a stock-related issue you must always take action in response to the identified situation.

The action required can be immediate on the spot remedial action to fix a problem, or action may mean reporting the issue.

Possible remedial action

The action you need to take when you identify a stock-related issue will depend on the issue or problem identified.

It is possible action may require you to:

- Notify relevant personnel. This may be:
  - ✓ Your supervisor
  - ✓ Owner/operator
  - ✓ Supervisor/manager of the department to which the stock relates e.g. Head/Executive Chef; Head Housekeeper; Food and Beverage Manager
- Arrange for maintenance where the problem relates to:
  - ✓ Damaged equipment, fixtures and/or fittings in the stores area such as shelving, containers, doors, walls, ceilings/roofs
- Equipment not working as required such as faulty refrigeration equipment
- You may need to organize:

- ✓ In-house maintenance
- ✓ External maintenance

- Relocate stock to protect unaffected stock and/or to prevent further damage to stock already impacted. This is a common requirement in the immediate short-term while you fix the problem or arrange for the issue to be addressed
- Protect stock as an alternative to relocating stock you may be able to take on the spot action to protect stock from further damage/contamination. This could require you to:
  - ✓ Close windows or doors
  - ✓ Cover the stock
  - ✓ Move damaged stock way from undamaged stock
  - ✓ Dispose of damaged stock. This involves:
    - ✓ Disposal of damaged/unfit stock to waste
    - ✓ Adjusting internal records to reflect disposal of items

Notifying relevant departments regarding stock disposed of to determine if replacement stock is required.

Arrange for stock items to be used immediately. In some cases an item slightly damaged may be able to be distributed quite successfully if it is used/offered for sale immediately. This means the normal FIFO stock rotation approach is not adhered to

act to address identified problems and threats as the need demands. This may involve

- adjusting stock temperature and storage area temperature
- Implementing or arranging for pest control
- Making repairs to store rooms and/or storage infrastructure
- Removing imminent threats to stock
- Removing damaged stock
- Cleaning
- Repositioning stock to safer/more secure areas.

LG#53	LO3: Transfer temperature controlled stock

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Handling and transferring goods
- Recording stores transfer information
- Conducting work

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Handling and transferring goods
- Recording stores transfer information
- Conducting work

Learning Instructions:

Read the specific objectives of this Learning Guide.

1. Follow the instructions described below.
2. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
3. Accomplish the “Self-checks” which are placed following all information sheets.
4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
5. If you earned a satisfactory evaluation proceed to “Operation sheets
6. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
7. If your performance is satisfactory proceed to the next learning guide,
8. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information sheet 1 Handling and transferring goods

1.1 Stock handling

It is standard procedure all stock delivered into a store needs to be rotated so the older stock is used before the newer stock.

Stock rotation must be applied to help avoid situations such as:

- Stock loss due to items becoming out of date stock
- Stock looking old and tired by virtue of spending too long in storage. This stock is unattractive and customers will not buy it
- Damage to stock – or a reduction in quality – that may occur if stock spends excessive time in storage. The longer an item spends in storage the greater the risk of damage to it.

There are limited instances where certain products may be bought with the deliberate intention of not rotating them.

For example: Some wines may be bought and cellared for future use as a specific strategy to increase their value

Stock rotation

1.2 Stock rotation options

The four stock rotation options are:

- First In, First Out (FIFO)
- First In, Last Out (FILO)
- Last In, First Out (LIFO)
- Last In, Last Out (LILO).

The most commonly used method of rotating stock in hospitality outlets is the First In, First Out method.

This means stock should be used or sold in the order it has arrived into the premises.

In practice this means you will need to:

- Move old stock forward and place the new stock behind it. Never load new stock in front of existing stock

- Lift existing stock up and put new stock under it
- Create a new storage area/stack for new stock and make sure the old stock is used before this new stack is started
- Log the identification information on items (such as kegs of beer, cartons) when they are stored by date and then make sure you refer to this record when using kegs or cartons to make sure you use the old ones first
- Check best-before and use-by dates and use oldest stock first.

Information sheet 2: Recording stores transfer information

All staff involved with receiving and storing stock will have some responsibilities relating to stock-related documentation.

Stock control

- Manual (paper-based)
- Electronic (computerized)

Computerized systems

Larger properties or organizations with large stock turnover rates tend to use a computerized stock control/management system.

An electronic (computer-based) stock control system may be integrated with point-of-sale equipment (such as registers/terminals) and accounting software for payment of accounts and generation of invoices.

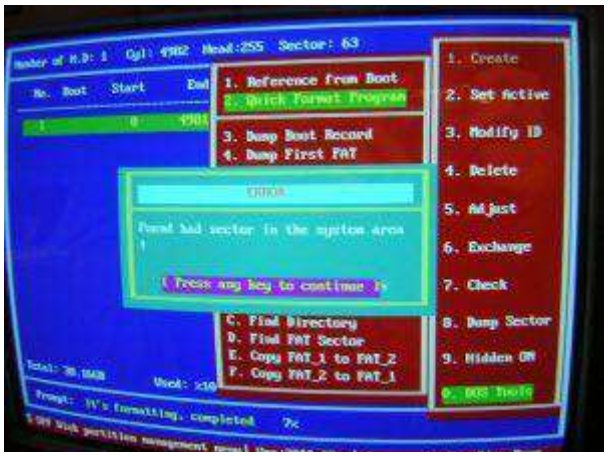

Fig 2.1 computerized stock control

Even where a computerized/electronic system is in use, paper-based documents (such as Purchase Orders, Delivery dockets, Invoices, Credit notes, Statements, Sales dockets and cash register/point-of-sale terminal audit rolls/tapes) will usually provide the raw data entered into the system.

From a „receiving and storing stock" point of view, use of this system may involve you in:

- Creating files for new suppliers and customers

- Entering supplier and product details such as names and addresses, prices, minimum order quantities
- Deleting files relating to individual suppliers and product lines
- Updating data – entering details of:
    - ✓ deliveries into the system - quantities and dates
    - ✓ Stock issued or transferred to departments
    - ✓ Stock that has been damaged or has to be discarded

Adjusting stock levels given on the computer on the basis of physical stock takes.

Every stock item has its own file in a computer-based system. Every bottle size for the one brand will have its own file, every different vintage and/or variety of a wine will have its own file, different qualities of spirits (such as red label, green label, black label or three-star, five-star) will have their own file.

It is critical the correct file is accessed when updating information for the product.

Paper-based systems

Companies operating a paper-based stock control system will use the following internally-generated documents as the basis for their system:

- Bin cards
- Internal transfer sheets

In addition to these internally-generated documents, the paper-based system also uses externally-generated documents such as Delivery dockets, Invoices, Statements and Credit notes.

Fig 2.2 paper based recording

Updating system information

Information will need to be updated in the stock control/management system when stock is:

- Ordered – so deliveries can be anticipated, and so others know what has been ordered to avoid „double ordering" of an item
- Received – identifying what has been delivered by item type, description and quantity
- Moved into storage – showing movement of stock within the property
- Issued to a department – indicating stock issued to operating departments by type, date, and quantity

Moved between departments – to enable accurate performance statistics to be calculated for each department.

Disposed of at a lesser selling price than normal – perhaps due to damage, or the fact stock was approaching its use-by date

Given away – as a donation to a charity, club, for PR purposes

Thrown out – due to damage, being in an unsafe or unsaleable condition.

Information may also need to be updated when:

New stock lines are purchased.

New files will need to be created providing (depending on the system being used) details such as:

- Product type and brand name
- Size, volume, weight
- Internal stock code for the product
- Maximum, minimum and reorder figures for the item

Providing the details in data fields is also referred to as „populating" the data fields

Lines are quitted. This may involve the closing of a file when the business decides it will no longer stock, buy or use the product

New suppliers are used. The same product can be purchased from different suppliers and from time to time the venue may switch suppliers if they can obtain a better deal (or service) from an alternate supplier

Where the venue elects to change suppliers, the file for the product remains but some data fields within the file will need to be changed to reflect the different supplier, new price or other relevant detail

Different sizes or qualities of product are introduced to the system. Every stock item has its own file. You cannot add a different size, quality, style, colour, brand name into an existing file. A new file must be created which updates the system to reflect the change in product

Changes are made to purchase prices and/or selling prices. If the cost price of an item changes, this must be updated into the system. If the venue alters the selling price, this too must be updated.

Note:

- Not all systems require cost and selling prices to be entered
- Many properties will require administration staff to enter this data

Management alters directions in relation to the size of inventory such as amending maximum, minimum and/or reorder levels/quantities.

Documentation

Stock-related documentation needing to be checked and verified can include paper-based documents or their electronic equivalents.

Reporting problems

You will need to report instances such as:

- Plant and equipment malfunctions
- Indications there has been a security breach or theft has occurred
- Collapse of shelving or storage equipment
- Situations where you are running out of storage space
- Stock lines not moving or moving slowly
- Stock lines being used faster than normal
- Accidents or OHS incidents
- Conditions exist or have emerged jeopardizing the quality or safety of products in store
- Situations where a physical stock count reveals a significantly lesser number of items than the stock control system indicates should be in stock.

Responsible personnel

Any problems identified in storage areas should be immediately reported. Face to face reporting or using the phone are the usual methods to use.

The person to whom you report can be expected to include one of the following:

- Your supervisor
- The duty manager
- The owner
- The Maintenance department.
- In some premises it may also be necessary to accompany this verbal report with some form of written report, such as a Maintenance Card.

Information sheet 3: Conducting work

Introduction

Stock in a housekeeping department is valuable and should be treated as such.

Staff must understand while certain items may be referred to as „giveaways", they are not intended to be given away to staff.

Where staff take these items for their own use, it is theft and can lead to instant dismissal.

Most properties will have strict rules forbidding staff taking home any items even if they are out of date. This is to guard against staff deliberately allowing things to exceed their use-by/best-before date, and to prevent the possibility of them sneaking in a couple of in-date items with the unusable items.

3.1 Internal transfer sheets

Any stock moved between departments for whatever reason (for example, for stock rotation purposes, or where one department borrows an item from another department because they have run out) should have an accompanying internal transfer sheet/record" completed to enable management to:

- Reallocate the item to the department that will actually use it since this is the department that will generate the revenue for the product
- Deduct the item from the stock issued to the original department so the cost of that item is not charged against them when they will not be selling or using it.

Do other checks at the same time as rotating stock

When rotating stock you will be physically handling items so it is a good opportunity to do two or more jobs at the same time.

When rotating stock use the process as a chance to:

- Check the dates to identify if stock is approaching its expiry date and needs some sort of action taken to use the items

- Check for signs of pest and rodent attack or infestation e.g. Are there mice droppings on the shelf? Does it appear mice have gnawed through boxes?
- Check the quality of the product e.g. Does it look as if it is deteriorating in storage? Has it been damaged in storage?

3.2 Cleaning storage areas

The way in which stock areas are maintained will vary between premises, and between individual storage areas within the same business, but the general aims and requirements will remain essentially the same.

3.2.1Maintaining storage areas

The general requirements commonly applied industry-wide in order to maintain a stock area are:

- Keeping the stores area clean and tidy at all times by:
  - ✓ Cleaning up spills as they occur
  - ✓ Implementing cleaning schedules for the area
  - ✓ Removing wrapping, packaging and waste
  - ✓ Cleaning and tidying as part of other store room activities as opposed to making „cleaning and tidying" a separate task

Fig 3.1 cleaning equipment

- Storing all stock as soon as possible after delivery to:
  - ✓ Guard against theft
  - ✓ Remove potential tripping hazards
  - ✓ Keep the area clear for future deliveries
  - ✓ Refrigerate items requiring refrigeration
  - ✓ Protect against damage that can occur to items left lying around in the delivery area caused by other deliveries being made or general staff traffic in the immediate area.
- Keeping stores area well-lit and ventilated to deter pests and allow for easy identification of stock items and problem issues
- Keeping shelves, benches, pallets, bins and other storage containers in good order and inspecting the area/fixtures and fittings on a regular basis for signs of damage or deterioration or other problems such as stability, security and pest infestation
- Maintaining all equipment and storage areas in accordance with the relevant occupational health and safety requirements and (for beverage storage and food-related items such as single-use items and food packaging) the requirements of food safety protocols for the property
- Conducting preventative maintenance checks on floors, walls, lighting, storage areas and containers and fixtures within the stores areas
- Checking the temperature of refrigerated storage areas
- Initiating preventative maintenance servicing for plant and equipment in the stores area as opposed to waiting until items break down before servicing them
- Restricting access to the stores area as required by the organization. This can involve prohibiting staff access to the stores areas, or limiting access to nominated staff only at designated times
- Closing and locking doors to stores areas when the area is not attended. Further security actions may include activation of alarms, maintenance and operation of closed circuit television

- Developing and implementing a proper cleaning schedule for the stores areas including ensuring supplies of all necessary chemicals and equipment exist to get the job done.

Activities involved in keeping storage areas clean

Keeping storage areas clean includes the following practices:

- Removing waste. This means physically removing empty boxes, cartons, crates and dividers from which stock has been taken
- Packaging and wrapping materials – used to protect and wrap items unloaded on to shelves and/or into containers
- Cleaning the area in line with venue requirements such as in accordance with the cleaning schedule for the area. This may include:
  - ✓ Sweeping
  - ✓ Mopping
  - ✓ Using a pressure washer
- Identifying and removing unsafe, unusable or unsaleable items from the storage areas such as:
  - ✓ Damaged items
  - ✓ Food that has exceeded its use-by date
  - ✓ Food contaminated by vermin
- Attention must always be paid to identifying any items that can be returned to suppliers for credit
- Applying environmentally friendly practices to waste materials where appropriate. This may include:
  - ✓ Re-using materials elsewhere within the organisation:
    - An item unsuitable for the Five Star dining kitchen may be suitable for a less expensive, fast food outlet
    - Damaged linen unsuitable for guest rooms may be suitable for use in the kitchen as cleaning cloths
  - ✓ Recycling suitable materials. Current waste management practices include the sorting of waste into the following categories in order to facilitate recycling:
    - Paper, including cardboard and newspapers
    - Plastic, including beverage bottles

3.3 Cold storage hazard and safety

Cold storage spaces include refrigerator or freezer boxes or rooms in which food and other materials can be stored or processed at controlled, cool temperatures. When you

work in and around such spaces, get training and be aware of the hazards that might be involved with cold storage: cold stress, slips and trips, confined space, chemical storage, and ergonomics.

Dress in warm, layered clothing for proper insulation to maintain your body temperature to prevent cold stress. Your head loses the most body heat; for extra warmth, wear a warm cap with ear flaps. Fingers, hands, toes, and feet are susceptible to frostbite with long term exposure to cold; protect them with insulated, moisture-proof gloves and boots.

Choose gloves appropriate to your job tasks; adequate gripping surfaces help you securely grasp cold or frozen objects. These objects can be heavy; a firm grip and steel-toe boots protect your toes. Ensure that your boots have no-slip soles; water and ice are common in cold storage and pose slip and trip hazards.
Because cold storage areas may be confined spaces, get training and become familiar with the safety features at your worksite. For escape in an emergency, cold storage rooms should have at least one door that opens from the inside. Lighting must be supplied through a constantly burning bulb or a light with an illuminated switch located inside the cold room. Non-slip flooring mats protect workers in wet areas.

Ideally, cold storage spaces have doors that are designed not to freeze shut. If anti-freeze doors are not installed in your workplace, ensure that a firefighter's axe is stored in the room. Exceptions to this rule include mental and corrective institutions and cold storage with temperatures above 32 degrees Fahrenheit.

Items in cold storage are often valuable and require security. Doors at your worksite may be locked from the outside provided the door has an inside release mechanism. Other options include posting warning signage on the door and providing audible and visible signal systems inside the room that are tested daily.

Ensure that chemicals in cold storage are stocked properly and with compatible materials. Take caution with dry ice and liquid nitrogen which can pose an asphyxiation hazard by displacing oxygen. Note that forklifts and combustion equipment can cause fumes to build up in enclosed spaces – use only with proper ventilation.

You can keep cold storage areas safe. Protect yourself from strains and sprains; always lift reasonable loads using proper lifting techniques. Watch out for your co-workers and check cold storage areas periodically and at closing to ensure no one is trapped. Clean up spills and clutter for good housekeeping and to prevent slip and trip hazards.

Fig 3.2 Cold store PPE cloth

Fig 3.3 cold store safety shoe

Fig 3.4 safety glove for cold store

The Limitations of PPE as a Hazard Control Method

In the Hierarchy of Controls, Personal Protective Equipment (PPE) is listed as the last line of defense against injury, disease and death. After a hazard assessment is done on a job task and the risk of injury or exposure is considered medium or high; controls need

to be considered using the Hierarchy of Controls. If the hazard cannot be eliminated or substituted; engineering controls and administrative controls need to be used to mitigate the hazard. PPE is often a necessity to use after all other controls have been considered and applied even though it is the least effective method of control. Therefore, it is important to understand the limitations and signs of failure.

Here are some limitations of PPE which need to be considered:

- PPE does not eliminate the health or physical hazards of the chemical.
- PPE can provide a false sense of security.
- Basic safety principles such as engineering controls, awareness and housekeeping must still be used.
- If the risk changes for the job task, the PPE may not match the new hazards.
- PPE in itself can add a new hazard to the job.
- PPE can restrict comfort and movement.
- PPE can restrict breathing, vision and communication.
- PPE elevates the risk for heat stress and dehydration.
- PPE can create psychological stress for the worker including symptoms of claustrophobia and panic attacks.
- PPE needs to be fitted to you specifically. PPE should not be shared.
- PPE needs to be removed before going home. Contamination on your PPE can follow you home from work and expose others in your household.
- PPE needs to be in good working condition to protect you.
- If PPE is found to be defective, it should be discarded and replaced.

Reference Materials

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AKNOWLEDGEMENT

We wish to extend thanks and appreciation to the many representatives of TVET College/ Institutes Trainers and respective experts of Regional TVET bureau, Bishofitu management institute Librarian, UNESCO and Federal Technical and Vocational Education and Training Agency (FTVET) who donated their time and expertise to the development of this Teaching, Training and Learning Materials (TTLM).

We would like also to express our appreciation to the TVET College/ Institutes Trainers and respective experts of Regional TVET bureau, Bishofitu management institute Librarian, UNESCO and Federal Technical and Vocational Education and Training Agency (FTVET) who made the development of this Teaching, Training and Learning Materials (TTLM) with required standards and quality possible.

This Teaching, Training and Learning Materials (TTLM) was developed on September, 2020 Bishoftu management institute

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