workplace safety & health guidelines

service allied to the transport of goods

contents

Introduction

Logistics (service relating to the transportation of goods) is a sector that involves the moving of goods or cargo from point to point via a variety of transportation vehicles. This may range from picking of goods using forklift, stacker and other suitable equipment to palletizing, loading, unloading and depalletizing. The supply chain management method of handling goods has heightened the need for more safety and health awareness among various stakeholders.

The logistics industry contributes significantly to our country's economy and supports many other economic activities. Logistics industry employees such as warehouse assistants, deliverymen, container drivers, cargo handlers, packers, freight forwarding and crating services employees, can be exposed to a variety of safety and health hazards at work depending on their specific tasks. Musculoskeletal disorders and injuries can arise from manual handling activities. Workers may be exposed to chemicals, noise, vibration and thermal stress. The type of accidents that may occur include falls, being hit by falling objects, crushing injuries, electrocution as well as fire and explosion.

Work-related injuries and diseases can happen as a result of unsafe acts and conditions. Unsafe acts occur when employees are unaware of the hazards and the proper work practices, for example, not adopting the proper lifting methods. Unsafe conditions arise out of ignorance or lack of diligence in ensuring a safe and healthy working environment, for example, a slippery floor. Work-related accidents and diseases can be prevented by identifying the hazards and taking appropriate preventive measures.

These guidelines provide information and guidance on the identification of work hazards and their prevention. Employers should work together with employees to establish a safe and healthy work environment.

workplace health hazards

Manual Handling Hazards

Manual handling of materials is one of the most common activities in a warehouse. It includes lifting, lowering, pushing, pulling, carrying or holding an object. Injuries to the back, neck, shoulders, arms and hands can occur during manual handling. Musculoskeletal injuries could result from a single episode such as lifting a very heavy load or slipping and falling. However, more often it is the result of gradual wear and tear from repetitive and prolonged manual activity. Recovery from some of these injuries may take time and further injury may occur, making the problem worse. Therefore it is important to identify the risk factors and take preventive measures to minimise the risk.

Factors that Increase the Risk of Injury

Heavy or bulky loads

The heavier the load, the greater the risk of injury. Regularly lifting loads over 25 kg can result in a higher risk of back injury. A bulky object is more difficult to lift because it cannot be brought close to the body. Lifting a bulky object may also force one into an awkward and unbalanced position or cause obstruction of vision. Correct lifting postures have to be adopted to minimise injuries.

Bending the back when handling loads may result in back injuries

Awkward postures

Prolonged awkward postures increase stress on the muscles and ligaments. Examples of awkward postures include bending or twisting the back during lifting or working with the arms above shoulder height to retrieve objects.

Position of the load

A load lifted far from the body puts more stress on the back than the same load lifted close to the body. The preferred range of lifting is between the knee and shoulder height. Lifting above and below this range is more hazardous.

Incorrect manual handling methods

Inexperienced, untrained and unskilled employees may be at greater risk of injury.

Poor workplace design

Poor layout of the workplace increases the risk of injury. Shelves that are too deep, too high or too low cause unnecessary bending or stretching. Lack of space to move freely, unsuitable dimensions of furniture and equipment, poor lighting, slippery floors and poor housekeeping also increase the risk of injury.

Prolonged, repetitive and fast-paced work

The risk of injury increases when the task is carried out more often, or over a longer period. Staff shortages, unrealistic targets and insufficient rest breaks may increase the risk of injury. This is of particular concern for deliverymen who have to meet tight schedules.

Over-stretching while handling loads increases stress on the muscles and ligaments

Good Ergonomic Practices for Warehouse Workers

Warehouse workers receive and unload goods from trucks, move the goods and store them. They also pick, pack and load goods onto delivery trucks. This involves manual handling, pushing and pulling of jacks and trolleys and handling of powered vehicles and equipment. They may also have to work on very tight schedules.

The risk of manual handling injuries may be reduced by re-designing the hazardous task and the work environment. Proper equipment and training in the proper lifting and carrying methods should also be provided to prevent back strain and injury.

Conveyor belts can help reduce the strain from lifting and carrying

Modifications to Work and Work Environment

Eliminate manual handling of heavy loads

Wherever possible, use automation or lifting equipment such as fork lift trucks, cranes and hoists to minimize the manual lifting of heavy loads. Always ensure that the forklift driver is properly trained to operate the machine.

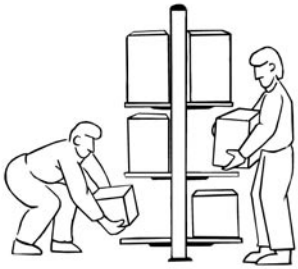
Use lifting equipment like forklift trucks to lift heavy loads

Modify workplace layout

Rearranging the layout or design of the plant, equipment or furniture and sequence of operations can reduce twisting, stretching and stooping. Eliminating height differences can reduce bending and lifting from the floor. This can be done by using a height-adjustable trolley, level loader or a forklift to raise the level of the pallet.

Dos & Don'ts

Use a height adjustable trolley to reduce the need to bend over to retrieve the load



Store heavier and more frequently used objects at waist level as this is a safer level for handling

Use a pallet turntable to reduce the need to stretch over to retrieve the load.

Modify the load

The use of smaller and less heavy packaging can reduce the load and its bulkiness. For example, a load of 30 kg can be re- packaged into two 15 kg packages. For heavy loads, the weight should be indicated on the load to warn workers. Suitable handles or hand grips may help improve the handler's grasp.

Use lifting equipment like pallet jacks and trolleys to lift heavy goods

Use pallet jacks and trolleys to move goods

- Ensure that the load on the pallet is even
- Pull manual pallet jacks on the level ground
- Walk slowly
- Back pallet jacks down ramps or into closed areas
- Lubricate the wheels and hydraulic handles regularly
- Do not use if the fork wheels are damaged

Practise Good Manual Handling Methods

Proper handling techniques

Step 1: Assess the load and plan the lift. Do you need help? Can you use any lifting equipment? Clear the path of any obstructions. Place one foot at the side of the load and one foot behind the load.

Step 2: Bend your knees and keep your body straight. Bring the object close to your body, grasp the object firmly and hold the object close to the body. Keep your arms, chin and elbows as close as possible and tight. Channel your body weight to both feet.

Step 3: Lift the object by pushing up on your legs. Avoid jerking or twisting your back.

Step 4: Ensure feet are stable and good grip on object before moving off.

Don'ts

- Lift with wet or oily hands
- Turn by rotating at the waist
- Lift heavy items if you are not in good physical condition
- Jerk to lift an object off a surface
- Drop an item to put it down
- Run when carrying an object
- Hurry up or down stairs or ramps
- Carry items by the straps or tapes

Proper Techniques for Stock Picking

Musculoskeletal injuries may result from overstretching or exertion during retrieval of items from shelves.

Bending and forward stretching to reach loads stored in deep shelves can cause discomfort.

A trolley with a ladder allows workers to pick items from higher shelves and place them on the trolley. Care should be taken to avoid twisting the back.

Design shelve height and depth to minimise back bending and forward stretching. Also avoid twisting the back during retrieval of items.

Overstretching or twisting the back when retrieving items from shelves may result in musculoskeletal injuries

Good Work Practices for Packing and Shrink Wrapping

Dos

- Use rolls that are lightweight for manual wrapping
- Use an automated pallet wrapping device if available
- Raise the height of the pallets to reduce back bending

Use all automated pallet wrapping device if available

Good Ergonomic Work Practices for Deliverymen

Deliverymen load and unload goods to and from the delivery truck and transport them to the various outlets on a very tight schedule.

Manual handling activities carried out at a fast pace are common. Space constraints in the delivery truck and poor design in some receiving outlets can result in limited access and awkward postures.

Good work practices, the provision of sufficient manpower, a reasonable schedule, good planning of the routes and proper equipment are important measures in the protection of the safety and health of deliverymen.

Safety shoes protect feet and prevent slipping

Do not overload or pile loads too high on trolleys

Safe Work Practices for Moving Goods on Trolleys

- Place loads evenly on trolleys to prevent tipping
- Load and secure items on trolleys so that they will not slip or fall
- Do not overload or pile loads too high on trolleys
- Push rather than pull trolleys on level ground
- Do not place hands where they may be hurt by doorways, walls or other objects being passed by
- Walk at appropriate pace when pushing trolleys
- Ensure trolleys are properly maintained, for example, wheels aligned and parts regularly lubricated
- Wear gloves and safety shoes
- Two men working as a team
- Use stackable trays to provide stability
- Use the J hook to reduce bending
- Provide ramps at entrances
- Provide an automated tail-gate to reduce manual lifting of goods from the truck to ground level
- Ensure that truck is free from any obstruction that may hinder the movement of goods from the tail-gate to inside the truck

Use trays with handles for better grip

For freight forwarding goods that are to be transported by aircraft, provision of suitable means of securing is needed to ensure that the goods will not topple or fall during the transportation by a tractor to the terminal and then to the aircraft.

Chemical Hazards

Some warehouses store chemicals and pack them into containers or bags. Warehouse assistants who handle or pack chemicals and deliverymen who transport them can be exposed to the chemicals.

Hazardous chemicals can be corrosive, irritating, toxic, flammable or carcinogenic. Direct skin contact with some chemicals can cause burns or skin rashes from irritation or allergy. Chemical spills and splashes can damage the eyes. Volatile chemicals, such as solvents, can be inhaled. High concentrations of vapour or gas can accumulate particularly in poorly ventilated and confined areas. It is therefore important that employees who work with chemicals are made aware of the hazards, be trained in handling the chemicals and follow safe work practices to avoid chemical exposure.

Use a local exhaust ventilation during chemical filling

Wear proper personal protective equipment when packing powdered chemicals

Safe Work Practices for Handling Hazardous Chemicals

- Provide local exhaust ventilation where there is a risk of inhalation
- Provide emergency showers and eye wash where corrosives are handled
- Wear suitable personal protective equipment
- Restrict unauthorised access to hazardous chemicals storage areas
- Inspect chemical stores regularly to check for deterioration or leakage
- Keep stored quantity to a minimum
- Ensure that all chemical containers are properly labelled and warning signs are displayed in and around areas where chemicals are stored
- Ensure that every stored chemical has a Material Safety Data Sheet (MSDS). The classification of chemicals, labelling of chemical containers and format of MSDS should follow the Globally Harmonised System of Classification and Labelling of Chemicals
- Arrange for medical examinations for staff exposed to chemicals listed under the Factories (Medical Examinations) Regulations

Place fire extinguishers near flammables

Restrict access to hazardous chemicals storage areas

Proper labeling on chemical containers

Useful Guidelines for Controlling Chemical Hazards

Toxics

- Store toxic chemicals in proper containers
- Highly toxic chemicals should preferably be stored in double containment and kept under lock
- Do not store toxic chemicals on high shelves where there is a risk of dropping during transportation

Flammables

- Store flammable solvents in safety containers
- Keep flammable liquids in steel cabinets away from any heat source
- Do not keep flammable liquids on open shelves
- Do not store flammable liquids in refrigerators
- No smoking or naked flame should be allowed at or near the storage area
- Ensure availability of suitable fire-fighting equipment at the storage area

Storing Corrosives

- Store acids or alkalis in plastic or other suitable containers
- Keep strong acids and bases in separate cabinets, preferably with catch trays
- Store the main stock of concentrated acids and bases as near to the floor as possible

Storing Reactives

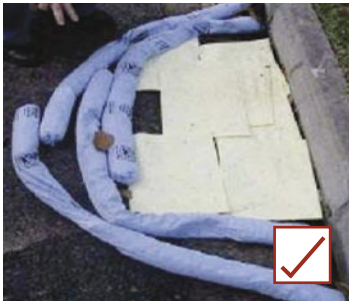
- Store in isolated, cool, dry areas and away from direct sunlight
- Keep open flames and other sources of heat away
- Avoid shock, friction and all forms of impact on the chemicals
- Do not store incompatible materials near each other to prevent accidental contact

List of chemicals and their incompatible chemical (s)

Chemical	Incompatible Chemical
Acetic acid	Chromic acid, nitric acid, hydroxyl-containing compounds, ethylene, glycol, perchloric acid, peroxides and permanganates
Acetone	Concentrated nitric and sulphuric acid mixtures
Acetylene	Chlorine, bromine, copper, silver, fluorine and mercury
Alkali and alkaline earth metals, such as sodium, potassium, lithium, magnesium, calcium, powdered aluminium	Carbon dioxide, carbon tetrachloride, and other chlorinated hydrocarbons (Also prohibit water, foam, and dry chemical on fires involving these metals- dry sand should be used)
Ammonia (anhydrous)	Mercury, chlorine, calcium, hypochlorite, iodine, bromine and hydrogen fluoride
Ammonium nitrate	Acids, metal powders, flammable liquids, chlorates, nitrites, sulphur, finely divided organics or combustibles
Aniline	Nitric acid, hydrogen peroxide
Arsenic materials	Any reducing agent
Azides	Acids

Handling Chemical Spills

- Isolate the area and contain the spill to prevent it from spreading through drains or any other openings
- Follow appropriate decontamination procedures when handling toxic chemical spills. Refer to the MSDS for specific recommendations
- Dilute acids with care. Always add acid to water, never add water to acid
- If a strong corrosive chemical is spilled, use a neutralising agent to neutralise it before flushing with water
- If a flammable liquid is spilled, turn off ignition and heat sources. Turn on the exhaust ventilation system if it is safe to do so. Evacuate all personnel from the spillage area if necessary



Isolate the area and contain the spill

Useful Guidelines for Controlling Chemical Hazards

- Guidelines on Prevention and Control of Chemical Hazards
- Guidelines on Risk Assessment for Occupational Exposure to Harmful Chemicals
- Guidelines on Local Exhaust Ventilation
- Guidelines for Material Safety Data Sheets

Please refer to the following MOM website for more information:
http://www.mom.gov.sg/managing_workplace_hazards

Other Health Hazards

Noise hazard

There are certain areas in the warehouse where staff may be exposed to a noisy process or equipment, for example, moving empty drums in the drumming line or driving a forklift with a noisy engine. Long term exposure to excessive noise may lead to hearing loss.

To prevent hearing loss, a person should not be exposed to noise levels exceeding 85dBA for 8 hours a day or its equivalent. Where the permissible exposure level is exceeded, measures should be taken to reduce the noise exposure.

Sound Pressure Level dB(A)	Maximum Duration per Day
85	8 hours
88	4 hours
91	2 hours
94	1 hour
97	30 minutes
100	15 minutes
103	7.5 minutes
106	4 minutes
109	2 minutes
111	1 minute

Permissible exposure levels showing the corresponding length of time allowed for the various noise levels

Some Noise Control Solutions

- Replace noisy machinery with quieter substitutes
- Locate noise sources away from hard walls or corners
- Isolate or enclose noise sources
- Construct suitable noise enclosures or barriers
- Line interior surfaces with sound absorbing materials
- Maintain machinery and equipment at regular intervals
- Wear ear plugs or ear muffs

Useful Guidelines for Controlling Noise Hazard

- Guidelines on Industrial Noise and Vibration Control
- Hearing Conservation Programme Guidelines

Please refer to the following MOM website for more information:
www.mom.gov.sg/wsh/noise_and_vibration

Use suitable hearing protection

Enclose noisy machinery to reduce the noise in the warehouse

Vibration hazard

Warehouse workers who operate forklifts or other powered vehicles and those who drive or sit in delivery trucks may be exposed to vibration hazards. Prolonged and excessive exposure to whole body vibration may lead to lower back pain and disorders of joints and muscles.

Some Vibration Control Solutions

- Provide sufficient cushioning or vibration absorbers on the seats of vehicles
- Maintain machinery and equipment at regular intervals

Thermal Stress

Some warehouse workers may work under extreme temperature conditions, for example, a deliveryman unloading goods under the hot sun or a warehouse operator working in a cold storage room. Such environment can be very uncomfortable and may affect the workers' health. An environment that is too hot can lead to headaches, fatigue and heat disorders like heat strokes, heat cramps and heat exhaustion. An environment that is too cold can lead to hypothermia and frostbites.

Preventing Cold Exposures

- Avoid standing directly in front of or below refrigeration vents
- Provide thermal insulation for metal handles and tools
- Provide adequate and suitable clothing and gloves for workers

Preventing Heat Stress

- Provide appropriate ventilation through a carefully planned and laid out exhaust and air conditioning system in the warehouses and in enclosed spaces
- Provide shelters for loading and unloading bays to shield against the sun
- Implement and follow an appropriate work-rest schedule
- Avoid thick clothing
- Drink plenty of water to avoid dehydration

Lighting

Poor lighting in the warehouse can cause eye strain and contribute to serious accidents. Adequate lighting should be provided for workers to be able to see clearly the task and machinery they operate.

Type of Interior or Activities	Maintenance Illuminance (Lux)
Corridors and walkways	50
General storage	80
Storage routinely involving reading tasks	160

workplace safety hazards

Hazards from Operation of Powered Vehicles

Most warehouses make use of powered equipment to handle or move materials. Powered equipment can be divided into two types: the built-in type which includes conveyor systems, narrow aisle systems, automated storage and retrieval systems and vehicular equipment which moves on wheels or treads, such as forklifts, reach trucks, platform lifts and mobile cranes.

Some common hazards linked with the use of such equipment are collision, being caught in between objects, being struck by falling objects and being crushed by the equipment. Thus, it is important that all persons operating these equipment are sufficiently trained in the safe operation of the equipment. The equipment should be inspected daily to ensure they are in good working condition before they are used.

Built-In-Type

Statutory lifting equipment

Statutory lifting equipment refers to hoist and lift, lifting gear, lifting appliances and lifting machines. This equipment must be inspected by Approved Persons within a specified time period.

Conveyor system

Roller and belt conveyors are used to move materials. Rotating mechanisms such as these can grip clothing or hair, or through skin contact, force an arm or hand into a dangerous position.

Use Rollers and Belt Conveyors with Care

- Guard the gears, chain drives and revolving shafts of live roll conveyor
- Install warning devices and controls for emergency stops at suitable places
- Announce the shut down of the machine, and put up warning signs before starting any repair or cleaning works
- Conduct regular inspections for defects
- Do not wear loose or frayed clothing or jewellery that could get caught
- Do not try to reach into any moving parts of the machinery with your fingers

Narrow Aisle System

In order to maximize the space usage and storage effectiveness, the aisles in between racks are often very narrow. Some powered industrial equipment are designed to be used in these narrow aisles.

Operating a Narrow Aisle System

- Follow manufacturer's operating procedure
- Allow only trained operators to operate the machine
- Ensure load capacity is not exceeded
- Inspect machine daily before using
- Do not remove any safety interlocks from the system

Automated Storage and Retrieval System

Automated guided vehicles do not need an operator. They follow pre-arranged routes controlled by sensors which follow light beams or induction tapes.

Using Automated Guided Controlled Vehicles with Care

- Follow manufacturer's operating procedure
- Inspect the automated guided vehicles regularly
- Announce the shut down of the machine and put up warning signs before starting any repair or cleaning works
- Do not remove any safety interlocks from the system
- Do not obstruct aisles used by the automated vehicle

Vehicular Equipment

Forklift

The forklift is commonly used in most warehouses. The type of hazards present in a location determine whether diesel, electric, gasoline or liquefied petroleum gas-powered forklift can be used and the additional safeguards that must be present.

Battery-charging installations must be located in areas designated for that purpose. Facilities must be provided for flushing electrolyte for fire protection, for protecting charging apparatus from damage by trucks and for adequate ventilation for dispersal of fumes from gassing batteries. There must be no smoking in the charging area and special care must be taken to avoid electrolyte spray. Open flames, sparks or electric arcs in battery-charging areas should be prohibited at all times.

Only a trained and authorised operator, who has passed the Forklift Driver's Training Course, should be allowed to operate the forklift

Drive Forklifts with Care

- Only a trained and authorised operator, who has passed the Forklift Driver's Training Course, should be allowed to operate the forklift
- Follow manufacturer's operating procedure
- Carry out daily checks before operation
- Plan your lifts
- Inspect the load before lifting to ensure loose materials do not fall off during lifting
- Do not ride on forklifts
- Do not raise load over other workers
- Do not exceed the rated capacity

Stacker

Stackers are also used to help in the transportation of materials in the warehouse for storage.

Other types of mobile transporting vehicles

Prime mover, trailers and heavy trucks are some of the transporting vehicles that are being used to transport goods.

The following are good practices to observe whenever goods are moved from one location to another for further processing or for delivery to the client or customer.

Safe Use of Stacker

- Employer should provide sufficient training for workers before they start to operate the stacker
- New workers should be under the direct supervision of experienced workers
- Follow manufacturer's operating procedure
- Carry out daily checks before operation
- Do not exceed the rated capacity

Safe Work Practices for Transporting Goods

- Always conduct a pre-inspection check on the vehicle serviceability and road worthiness before moving off the road. Report any irregularities
- Do not drive or operate any vehicle if you do not have adequate rest, are medically unfit or under the influence of drugs or alcohol
- Do not speed along public roads. Follow the speed limit
- Goods should be stored properly and securely in vehicles before moving out.
- A final check is recommended by the supervisor to ensure that goods do not dislodged during transportation
- Always ensure that the vehicle chassis you are using is appropriate and suitable for the load that is being transported
- Load must not exceed the safe working load of the vehicle
- Ensure that the driver have sufficient safety training to operate the vehicle in a safe manner

Falling Hazards from Material Storage

Materials and goods should be stored properly to prevent them from becoming hazards.

Beside proper storage of materials, employers also have to provide safe means of access to and egress from the stored material for workers at all times. For example, ladders can be provided to access the stored material. The ladders used in the factory must be well constructed and properly maintained. They must also be securely fixed or held by a person to prevent slipping. In addition, if a worker is expected to work at a height, processes must be established to ensure the worker is safe, for example, provision of effective barricades, safety harnesses and independent lifelines.

Safety Tips for Material Storage

- Keep stored materials on firm foundation
- Use supporting structures to ensure stability
- Store materials in a stable manner
- Do not pile materials to obstruct lighting
- Do not obstruct fire fighting equipment, such as sprinkler, fire hoses and fire extinguishers
- Do not obstruct emergency showers and eyewashes
- Do not exceed the load ratings of floors and shelves
- Do not store material against partitions unless the partitions are able to withstand the pressure
- Do not store loose materials or liquids in raised areas

Electrical Hazards

Electrical equipment needs to be properly installed, maintained and operated. If not, it can cause electric shocks, burns, fire or explosions and in some instances even death.

Electrical Safety

- Do not use defective electrical equipment
- Do not attempt to repair electrical installations; leave it to the trained electricians
- Wires should be insulated to prevent contact with electrically energised wires
- Use appropriate electrical protective or safety devices such as fuses and circuit breakers to limit or shut off the flow of electricity in the event of a ground fault, overload or short circuit in the wiring system
- Provide workers who are required to carry out work using electrical equipment or work on live conductors with PPE such as boots and insulating gloves

Fire and Explosion

When the surrounding workspace contains flammable substances or explosive mixtures of liquids or gases, a small amount of heat can cause the substance or mixture to ignite and cause a fire or explosion.

The accumulation of static electricity can become a source of ignition and increase the risk of fire and explosion.

Static electricity is created due to the interaction between objects of different materials or through the movement of dusts or powders. The charges accumulated in the form of static electricity on any insulated object can be discharged when a person touches the object. If this is associated with a dust cloud or flammable substances in the surrounding workplace, an explosion is likely to occur.

Do not obstruct fire escape passages

Fire Safety

- Separate heat or source ignition of inflammable materials, gas or vapour
- Ensure that fire fighting equipment like fire extinguishers and fire hose are well maintained
- Do not obstruct fire escape passage ways
- Ensure workers are familiar with the means of escape

safety and health management system

Safety and Health Management System

Management of safety and health should be no different from the way other aspects of the business are managed. Employers are encouraged to develop and implement a comprehensive safety and health programme to prevent workplace accidents and work-related illnesses and to establish a safe and healthy working environment.

Safety Policy and Organisation

The management's commitment is important to ensure the success of the safety and health programme. There should be a written policy which clearly states the management's commitment and approach towards establishing a safe and healthy work environment. The policy should state the organisation's safety and health philosophy and structure, including objectives and goals to be achieved. It should spell out the duties and responsibilities of both management and staff. The written policy should be endorsed by the top management and communicated to all levels, including contractors.

Management Commitment can be Demonstrated by:

- Implementing safety policies, programmes and training with top management support
- Establishing appropriate safety performance goals throughout the organisation
- Involvement of management in safety and health activities
- Giving recognition to safety and health in work performance reviews
- Giving praise to employees who work safely and counselling those who do not

Responsibilities of Employer and Employee

The employer has a duty to ensure the safety and health of their staff and should take the lead in promoting safety and health.

Safety personnel should be appointed to advise management on all occupational safety and health matters, and assist in the implementation of safety and health programmes. Employees should understand that safety and health is not just the responsibility of the employer, but they too have a role to play.

Responsibilities of the Employer

- Develop and implement an effective Safety and Health Programme
- Inform all staff of workplace hazards and ensure that safety rules, training schedules and safe work procedures are followed
- Provide proper equipment including personal protective appliances
- Provide welfare facilities like rest areas and first aid boxes
- Document the Safety and Health Programme and keep records of all reported accidents, incidents and diseases

Responsibilities of the Employee

- Follow instructions and safe work procedures
- Attend safety and health training
- Use the safety devices and personal protective equipment provided properly
- Report accidents, incidents, diseases and any workplace hazards to the supervisor or employer
- Suggest ways to improve safety and health at the workplace

Risk Management

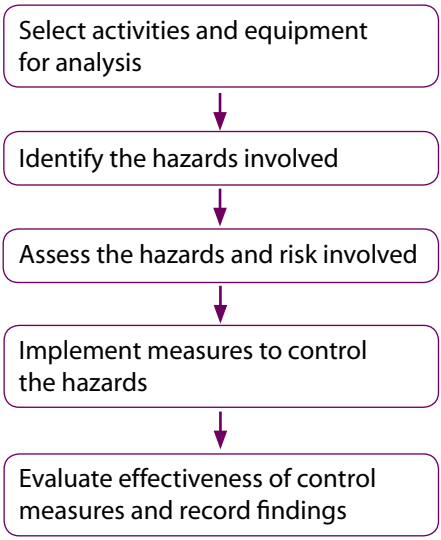
Risk Management is a key component of the new safety and health management framework underpinned by the new Workplace Safety and Health Act (WSHA) and WSH (Risk Management) Regulations. The Act aims to reduce risks at source by making stakeholders accountable for managing the risks they create.

Under the WSHA, risk management duties are imposed on every employer, self-employed person and principal (including contractor and sub-contractor). These parties must take all reasonably practicable measures to ensure that the workplace is safe and risk-free for every person within its premises.

The responsible parties must identify workplace hazards by reviewing both routine and non-routine activities carried out by workers and the equipment used, by assessing the risks posed by the hazards and developing measures to control the hazards. Before implementation, it is advisable to test the feasibility of the recommended measures. Documentation of the risk management process is also important.

The steps in a risk management exercise are summarised in the flowchart below:

Basic Steps to Risk Management



Risk assessments should be conducted by a team of persons who have a thorough knowledge of the work to be assessed. Team members should include management staff, process or facility engineers, technical personnel, supervisors, service staff, maintenance staff and safety personnel if available.

The team leader should have undergone training in risk assessment. Alternatively, a safety consultant trained in job safety analysis and risk management and who has experience in risk assessment can be engaged to facilitate the risk assessment.

The risk assessment team should also include contractor/supplier personnel who are involved with the work, whenever necessary.

Useful Guidelines for Risk Management

- Guide to Workplace Safety and Health (Risk Management) Regulations
- Quick Guide to Risk Assessment
- Risk Assessment Guidelines
- Activity Based Risk Assessment Form
- Trade Based Risk Assessment Form

Please refer to the following MOM website for more information:
http://www.mom.gov.sg/wsh/risk_management

Safe Work Procedures

Employers are encouraged to establish safe work procedures for the various types of work carried out. Wherever possible, these procedures should be incorporated into the standard operating procedures for staff to follow. Safe work procedures should also be effectively communicated to all staff.

Employers should establish a system to ensure that existing safe work procedures are reviewed whenever new equipment or processes are introduced or whenever there are changes to the operating procedures.

There are legal requirements for safe work procedures for certain work (see table below). No work shall commence unless the safe work procedures have been established and implemented.

	Work Requiring Safe Work Procedures
1	Work on any machinery where the fencing has been removed for the purpose of examination, lubrication or other operations
2	Work at a place where a person is liable to fall a distance of more than 3 metres or into any substance that is likely to cause drowning, poisoning, chemical burns or asphyxiation
3	Work in any confined space
4	Work involving application of heat, or the potential generation of any source of ignition, where any explosive or flammable substance is liable to be present
5	Maintenance or repair work on any pressure vessel or lifting equipment
6	Work on any process, plant, vessel or machinery that is liable to produce or give off any corrosive, toxic or flammable substances
7	Work in compressed air environment or under water
8	Pressurised testing of any pressure vessel or pipes
9	Spray painting
10	Dismantling of any pipe or equipment containing steam or substances that are flammable, toxic or corrosive
11	Any repair or maintenance work carried out on a pressurised hydraulic system
12	Radiography work

Safety Training

Safety training is important in providing staff with the knowledge and skills to work in a safe manner.

A programme to identify the safety training needs for each level of staff is useful for making training plans.

Safety and health training for supervisors is particularly important as they have a role to ensure that their staff work in a safe and healthy manner.

Safety and health training can be incorporated into the operational training of the staff. Such training can be carried out on-the-job, by trained supervisors, or by external trainers. Training records should be kept and training materials should be reviewed on regular basis.

When Should Safety Training be Conducted?

- During orientation period for new employees
- When new equipment or processes are introduced
- When staff are transferred to another department
- Periodically for existing staff

Group Meetings

Group meetings should be conducted regularly to discuss safety and health issues and disseminate safety and health information to staff, including contractors. Employers should provide adequate facilities for such meetings. All staff should be encouraged to participate.

Daily briefs and de-briefs (toolbox meeting) can serve as effective channels for conveying safety and health messages.

Workplaces with 50 or more workers should form safety and health committees with representation from management and employees. Details on the establishment of safety and health committees and its function can be found in the Factories (Safety Committees) Regulations.

Employers should encourage their employees to form Safety and Health Improvement Teams. This will provide them with a channel to contribute ideas and solutions to make their workplace a safer, healthier and more productive one.

Accident, Incident and Disease Investigation and Analysis

Every accident, incident or disease occurring at the work place should be investigated in order to identify the root causes and prevent similar occurrences in the future.

A system should be established for reporting and investigation of any work-related accident, incident or disease. Lessons learnt from the investigations should be communicated to relevant staff.

Accident statistics should be collected and analysed to identify problem areas and trends.

There are legal requirements for the notification of work-related accidents and occupational diseases to the Ministry of Manpower

Please refer to the following MOM website for more information:
http://www.mom.gov.sg/wsh/report_incident.html

Some Examples of Occupational Diseases Requiring Notification

- Industrial dermatitis
- Noise induced deafness
- Repetitive strain disorders of the upper limb
- Occupational asthma

In-House Safety Rules and Regulations

A set of written safety rules and regulations should be established for compliance by staff and contractors. These also serve as a reminder of their safety and health obligations and responsibilities. Key legal requirements can be incorporated into these rules and regulations.

More specific or detailed safety and health rules and regulations can be developed by each department.

Useful references for Setting up Safety Rules & Regulations

- National OSH legislation and guidelines (MOM website)
- Relevant Singapore Standards & Codes of Practice (SPRING Singapore)
- Overseas guidelines (link to references page)

Safety Promotion

Employers should establish promotional programmes to create safety and health awareness and build a strong safety culture at the workplace.

Examples of Promotional Activities

- Safety and Health Talks and Seminars
- Safety and Health Campaigns
- Safety and Health Exhibitions
- Newsletters
- Posters and Pamphlets

Evaluation, Selection and Control of Contractors

Management should establish a system to evaluate, select and control contractors. Such a system allows management to assess contractors based on their safety policy and procedures, safety performance records, safety training and competency records, before any work is awarded.

Safety Inspection

It is important to establish an effective programme to carry out periodic inspections to identify potential hazards, unsafe acts and conditions in the workplace, as well as to monitor any changes in the work process. Please refer to the sample inspection checklist (under resources) provided.

Such inspections should involve both the management and the employees. The findings from such inspections should be recorded and analysed. Recommendations and follow-up actions should be properly documented.

Maintenance Programme

An effective maintenance programme should be established for all equipment, machinery and tools used. This will help prevent accidents resulting from the failure of such equipment and machinery.

The programme should include the establishment of a complete list of machinery and equipment used, inspection and maintenance schedules and records. There should also be a system for staff to report any defective or damaged tool or equipment in the course of their work.

Many premises use steam boilers and air receivers. Management must ensure that the mandatory inspections of these equipments are carried out by authorised examiners once every 12 months for steam boilers and once every 24 months for air receivers.

Some Equipment that Require Statutory Inspections by Authorised Examiners

- Steam Boilers
- Air Receivers
- Steam Receivers
- Overhead Cranes
- Lifting Platforms
- Mobile Cranes

Occupational Health Programmes

Occupational health programmes targeted at specific hazards should be established. Each programme should specify the objectives, person-in-charge and component activities and their frequencies.

Examples of Occupational Health programmes

- Hearing conservation programme
- Management of hazardous substances programme
- Ergonomics programme

Emergency Preparedness

The establishment and effective implementation of an emergency response plan is crucial in saving lives and mitigating losses should an emergency situation arise.

An Emergency Response Team should also be established, with the duties and responsibilities of each member clearly defined.

Management should ensure that all staff are familiar with the plan and procedures in the event of an emergency. Regular drills and exercises should therefore be conducted. An evaluation of the drill performance should be carried out and lessons learnt used for improving the plan.

Examples of an emergency situation would include a fire, failure or collapse of a structure and harmful gas leakage.

What should be included in an Emergency Response Plan?

- Procedures for the raising of alarm
- Procedures for the evacuation and rescue of victims
- Provision of the means of rescue and first aid
- Provision of a means of communication with the relevant government authorities and response agencies..

Documentation and Review of Programme

There should be a system for the documentation and regular review of the programme. This is to facilitate retrieval of relevant documents and to ensure that the programmes remain relevant and effective. All revisions to the safety and health manual should be dated and endorsed by authorised personnel. Recommendations that result from such reviews should be considered and implemented wherever possible.

resources

Sample Inspection Checklist

The sample inspection checklist can be used when conducting regular safety and health inspections. Go over every aspect of the workplace to identify possible hazards, unsafe acts and conditions in the workplace, as well as to monitor any changes in the work process.

Floors and Walkways	Yes	No
Are aisles clear of materials or equipment?	☐	☐
Are main aisles at least 1.12 m wide?	☐	☐
Are doorways clear of materials or equipment?	☐	☐
Are carpets or tiles in good condition, free of tripping hazard?	☐	☐
Are floors clean and free of oil or grease?	☐	☐
Are floors kept dry?	☐	☐
Stairs and Ladders	**Yes**	**No**
Are ladders safe and in good condition?	☐	☐
Are stairwells clear of materials and equipment?	☐	☐
Are stairs and handrails in good condition?	☐	☐
Are ladders and stairs provided with anti-slip means?	☐	☐
Electrical Safety	**Yes**	**No**
Are electrical wires in good condition?	☐	☐
Is there clear access to electrical panels?	☐	☐
Are proper plugs used?	☐	☐
Are plugs, sockets, and switches in good condition?	☐	☐
Are portable power tools and electrical equipment in good condition?	☐	☐
Fire Safety	**Yes**	**No**
Are fire extinguishers clearly marked?	☐	☐
Are fire extinguishers properly installed on walls?	☐	☐
Have fire extinguishers been inspected within the last year?	☐	☐
Are workers trained to use fire extinguishers?	☐	☐
Are flammable liquids properly stored?	☐	☐
Are smoke and fire alarms in place and properly maintained?	☐	☐
Are emergency lights in working condition?	☐	☐
Have sprinkler systems been inspected?	☐	☐
Are emergency exits clear of materials or equipment?	☐	☐
Are emergency exit signs working?	☐	☐
Are emergency lighting units provided?	☐	☐

Equipment and Machinery	Yes	No
Are equipment and machinery maintained in good condition?	☐	☐
Is machinery securely guarded?	☐	☐
Are operators properly trained?	☐	☐
Are switches clearly marked and easy to reach?	☐	☐
Do you have a lockout procedure in place?	☐	☐
Is there enough work space?	☐	☐
Are noise levels controlled?	☐	☐

Chemicals	Yes	No
Are Material Safety Data Sheets (MSDSs) provided for all chemicals?	☐	☐
Are workers trained in the hazards and preventive measures?	☐	☐
Are relevant personal protective equipment provided?	☐	☐
Are containers clearly labelled?	☐	☐
Are chemicals properly stored?	☐	☐
Are hazardous materials disposed of properly?	☐	☐
Are there procedures for chemical spills?	☐	☐

First Aid	Yes	No
Is the first aid kit accessible and clearly labelled?	☐	☐
Is the first aid kit adequate and complete?	☐	☐
Are emergency numbers displayed?	☐	☐
Are there trained first aiders?	☐	☐

Personal Protective Equipment	Yes	No
Do workers know where to find personal protective equipment?		
• Eye/face protection	☐	☐
• Footwear	☐	☐
• Gloves	☐	☐
• Protective clothing	☐	☐
• Aprons	☐	☐
• Respirators	☐	☐

Case Studies

Confined Space Accidents in ISO Tanks

In year 2002, a worker was found dead inside an ISO tank. He had been assigned to carry out a visual inspection of the tank that had unloaded its cargo of di-octyl-phthlate (DOP).

Investigations revealed that nitrogen was used as an expelling agent to unload the DOP from the tank. There was no fresh air purging of the tank after unloading had been done; therefore the tank remained nitrogen rich. The probable cause of death was asphyxiation.

The company was required to review its safe work procedures on confined space work and to implement a permit to work system.

In another accident, a worker from a logistics company was found dead in an ISO tank. Investigations showed that he had been exposed to high concentrations of solvent vapours while cleaning the tank with a wipe cloth and thinner. The excessive exposure was likely due to inadequate ventilation in the confined space.

The company had failed to establish and implement safe work procedures for work in the confined space. The atmosphere in the tank was not tested for toxic contaminants and certified safe for work by a competent person. The deceased did not wear a harness with a life line attached, and there was no standby person keeping watch outside.

Chemical Leak in a Storage Warehouse

A courier company received a package from overseas in its warehouse. The package was to be delivered to a local customer but the contents had leaked and a strong chemical odour emitted from the package.

The operators did not contain the spill effectively and the chemical gas affected a number of the workers working nearby. They were hospitalised.

The package containing hazardous chemicals did not have warning labels to warn workers handling it about the dangers of its contents and no accompanying Material Safety Data Sheets (MSDS) for transporters to refer to for safe handling.

The company was required to strengthen training on handling of hazardous substances and emergency situations dealing with hazardous substances.

SCDF placing the leaking package into a containment unit

References

Local references

Ministry of Manpower
Occupational Safety and Health Department

Division Legislation:
http://www.mom.gov.sg/legislation/wsh.html

- The Workplace Safety and Health Act (WSHA)
- The Workplace Safety and Health Act (WSHA) Subsidiary Legislations
- Factories Act Subsidiary Legislations

Guides to managing workplace hazard:
http://www.mom.gov.sg/managing_workplace_hazards

- Safety Circular on Lock-out Procedures (2000)
- Safety Circular on Safe Work Procedures (2000)
- Safety Circular on Electrical Safety
- Hearing Conservation Programme Guidelines (2002)
- Factsheets on Successful Noise Control Case Studies
- Guidelines for Industrial Noise and Vibration Control (1999)
- Guidelines on Prevention & Control of Chemical Hazard (2002)
- Guidelines on Solvent Management in Dry Cleaning (2000)
- Guidelines on Risk Assessment for Occupational Exposure to Harmful Chemicals (2002)
- Guidelines on Local Exhaustion Ventilation (2004)
- Guidelines on Material Safety Data Sheets
- Your Guide to First Aid Facilities in Factories (1996)

Singapore Standards, Productivity and Innovation Board (SPRING)
http://www.singaporestandardseshop.sg

- CP92: 2002 Code of Practice for Manual Handling
- CP76: 1999 Code of Practice for Selection, Use, Care and Maintenance of Hearing Protection
- CP 74:1998 Code of Practice for Selection, Use and Maintenance of Respiratory Protective Devices
- CP98: 2003 Code of Practice for Preparation and Use of Material Safety Data Sheets (MSDS)
- SS514: 2005 Code of Practice for office ergonomics

Overseas References

U.S. Department of Labour, Occupational Safety and Health Administration

- Grocery Warehousing
  http://www.osha.gov/SLTC/etools/grocerywarehousing/index.html
- Materials Handling and Storage, OSHA 2236 (2002), California Department of Health Services
- Warehouse Workers. Take the Hurt Out of Handling Materials, June 2001

Canadian Centre for Occupational Health and Safety

- Warehouse Workers Safety Guide
  http://www.ccohs.ca/products/publications/warehouse.html

U. K. Health and Safety Executive

- Getting to grips with manual handling – a short guide
  http://www.hse.gov.uk/msd/hsemsd.htm#manual

The American Society of Safety Engineers

- Warehouse Safety: A Comprehensive Review
  http://www.asse.org/pjuly.htm

Acknowledgements

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Ministry of Manpower
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Back Society of Singapore

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service allied to the transport of goods

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