

**THAI
MEIRA**

Occupational Health Safety and Environment

Manual



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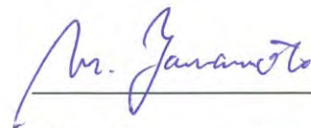
Occupation Health and Safety Policy

Thai Meira Co.,Ltd.

Thai Meira Co.,Ltd. A Manufacturing of High-Strength Bolts and Precision Fastening Parts for the automotive industry, has strong goals in operating business activities together with managing the occupational health and safety as follow.

To implement this we shell ;

1. Continual improvement to reduce risk of illness, accidents and incident in the workplace control of hazard from machines and equipment,chemicals,electricity and others which might occur to our employees,related parties and properties of the company.
2. Provided adequate and appropriate resources including of manpower, budget,time,training and the best work place of factory contest activity to develop our employees competence and awareness for implementing the occupational health and safety management system.
3. Instruct all superiors to educate and control their subordinates to strictly follow safety rules and regulations.



(Mr.Masashi Yamamoto)

President

Preface

Thai Meira Co., Ltd. is fully aware of the importance of the employees' safety in the workplace, considering the fact that safety is one of the crucial factors for the success of an organization. Accordingly, the Company emphasizes on promoting activities on safety, together with activities on productivity improvement, since safety plays an important role in reducing losses and production costs, while improving employees' welfare. Likewise, safety also contributes to the development of employees in the aspects of quality and responsiveness to the production policy.

Hence, the safety agency, on behalf of the Company and in collaboration with the Occupational Safety, Health, and Environment Committee, has prepared this safety manual to provide knowledge and advices on the operational safety guidelines.

The Company sincerely hopes that this safety manual will help to promote and improve safety awareness of the employees of Thai Meira Co., Ltd.

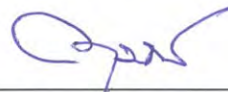
Best Wishes,

A handwritten signature in blue ink, appearing to read "Somchai Phabao", written over a horizontal line.

(Mr. Somchai Phabao)

Manager of Safety Department

June 3, 2011

A handwritten signature in blue ink, appearing to read "Krit Ninlaplub", written over a horizontal line.

(Mr. Krit Ninlaplub)

Chairman of Occupational Safety,
Health, and Environment Committee

June 3, 2011

Definition

Hazard A condition that is likely to cause injury to one self, damaged to one's property or material or affected one's normal working capability.

Danger The severity of the consequences caused by hazard. The severity of hazard may be high or low, depending on the control measures implement.

Damage The severity of the injury, physical loss, damaged to working operation or financial loss.

Accident Incident that occurred without advance planning, which leads to injury, disability or death and damaged to belongings.

Near Miss Unpleasant incident that happened but did not cause any damage or self-injury.

Safety In theory, it means 'Danger-free' but in practical it is accepted as **'Free from possible occurring danger'.**



CAUSES OF ACCIDENTS

Unsafe Conditions

- 👍 Machines, tools and equipment are defective, lack of repair or maintenance
- 👍 Incorrect factory layout
- 👍 Disorganized and unclean storage
- 👍 Poor working environment e.g. insufficient lighting, noisy, dusty, high temperature, vaporized chemical, and etc.
- 👍 No protection cards around harmful parts of machinery or other moving parts e.g. gear, chain, pulley, flywheel, spiral shaft, blades, or heat, etc.
- 👍 Defective electrical system or electrical equipment



CAUSES OF ACCIDENTS

Unsafe Acts

- 👍 Having incorrect attitudes, such as believing that accidents are the consequences of karma that cannot be prevented
- 👍 Fail to understand the situation and having wrong prediction
- 👍 Negligence, careless, lack of attention and caution
- 👍 In a hustle and/or taking shortcuts
- 👍 Remove the cover that protects the dangerous part of the machine and do not place it back
- 👍 Playing around during work
- 👍 Do not wear personal protection kit
- 👍 Unready or abnormal physical condition such as, drinking, hangover, having family problems, using illegal drugs etc.

Lack of cooperation in terms of safety

- 👍 Fail to attend safety activities
- 👍 Fail to obey the working safety regulations
- 👍 Fail to report accidents
- 👍 Lack of safety morals



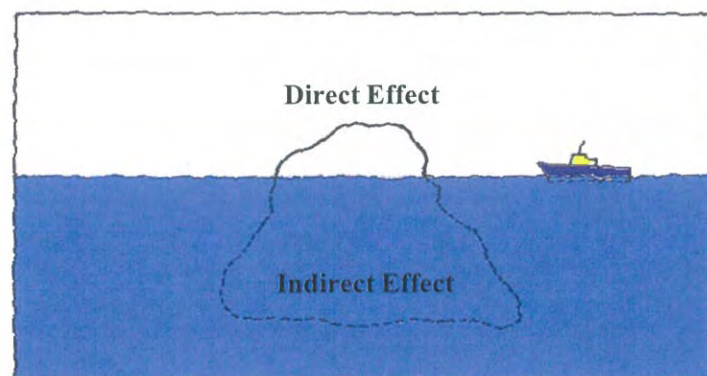
CONSEQUENCES OF ACCIDENTS

Direct Effect

- 👉 Injured, wounded body organs
- 👉 Illness caused by being on duty
- 👉 Loss of organs, disabled
- 👉 Death

Indirect Effect

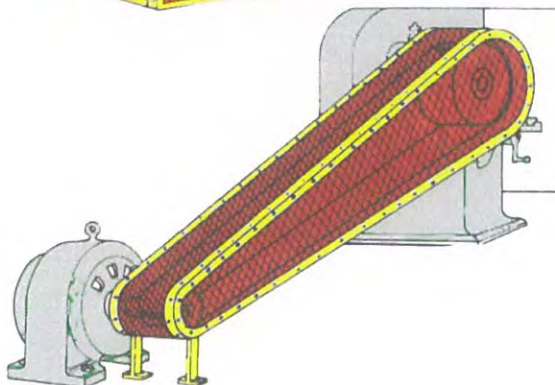
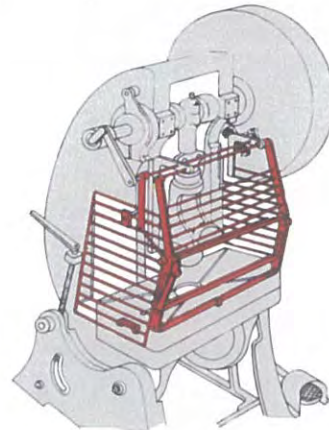
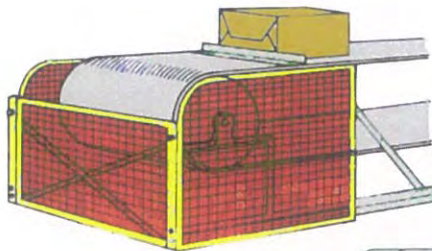
- 👉 Being absent, leading to lack of income
- 👉 Wasting time and expenses in medical treatment and travel expenses
- 👉 Losing job progression opportunity
- 👉 In case of being disabled, will increase the burden to the family
- 👉 Loss of social opportunities
- 👉 In case of death, parents, partner, and/or children will suffer difficulties
- 👉 The company loses a skilled employee
- 👉 The country loses a quality population that is an important factor for the country's development

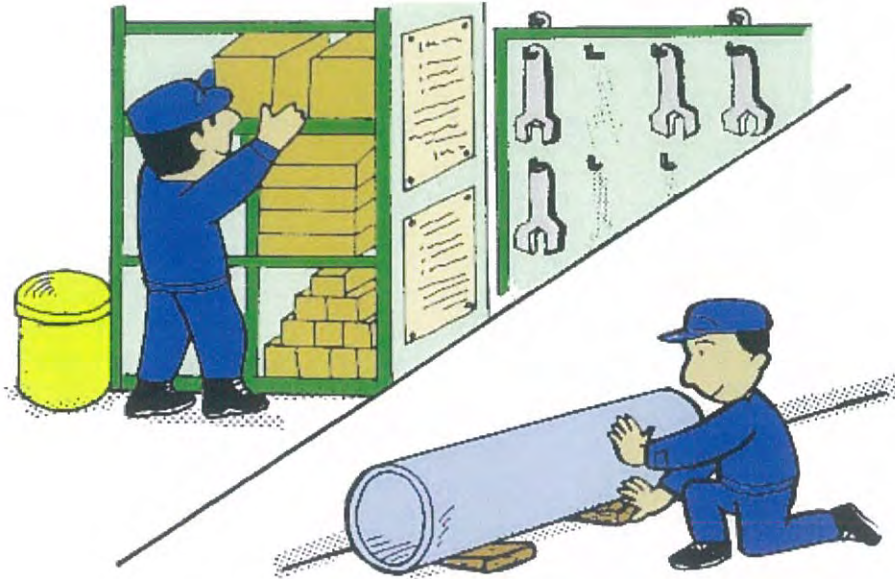


ACCIDENT PREVENTION POLICY

Source

- 👍 Designed a machine by taking safety into account
- 👍 Built a card to cover the dangerous parts
- 👍 Built a barrier that prevent people from entering the dangerous zone
- 👍 Installed switch button that requires pushing with both hands
- 👍 Installed emergency switch, as a switch button or emergency rope.
- 👍 Regularly check and repair machinery
- 👍 Installed card using safety light system



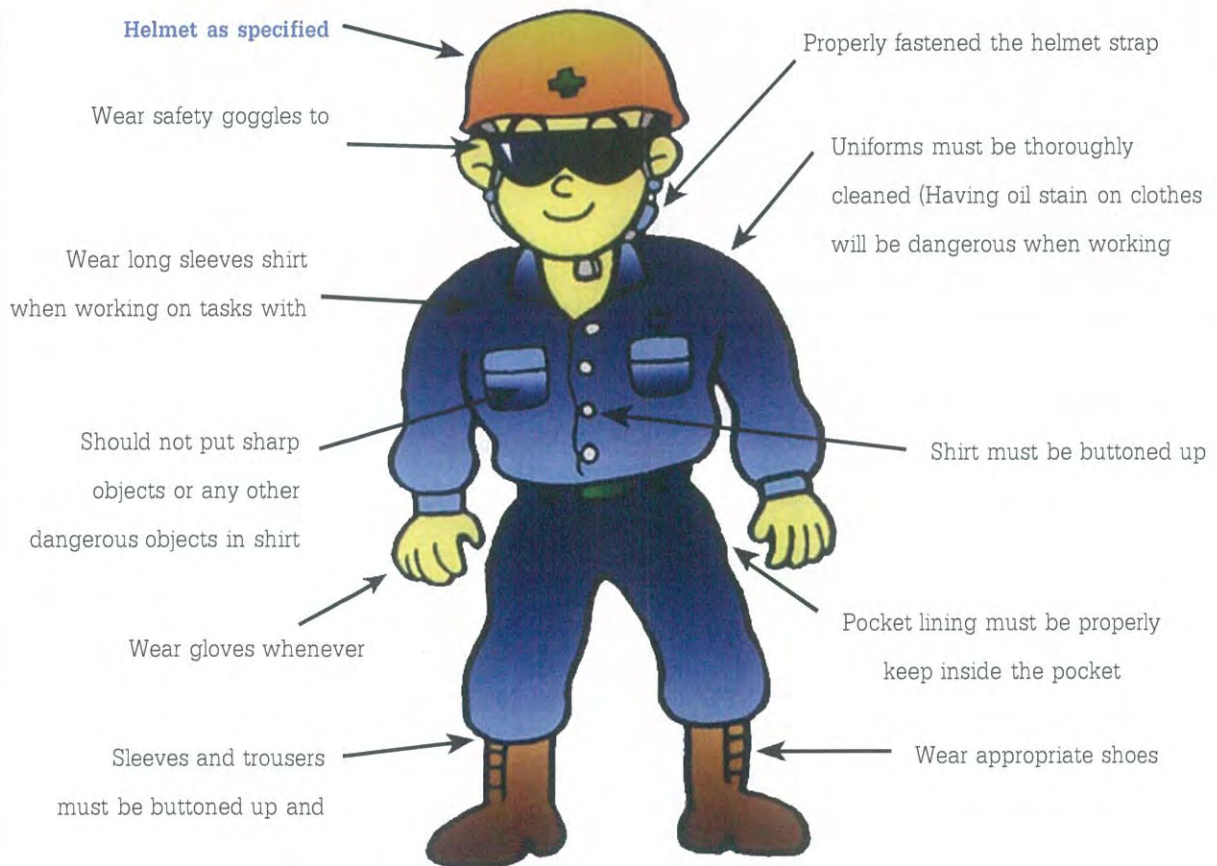


Prevention of Pathway

- 👍 Determined safety working procedures
- 👍 Arranged clean and organized working space
- 👍 Stored tools, equipment and cart in the specified location
- 👍 Long objects should not be placed against the wall, but should lie flat.
Round objects that are roll-able should be locked
- 👍 Installed danger signs or alarms
- 👍 Do not place any obstacles on the corridor, at the entrance, emergency exit or fire extinguisher
- 👍 Built a partition to separate danger zones from working area

Receiver

- 👍 Wear the correct and proper uniform, i.e.;
 - Shirt, sleeves, trousers, belt must be worn properly
 - Shirt must be buttoned up
 - Hair must be neatly tied or wear a hair net
 - Do not take clothes off while working
 - Do not wear wet or oily clothes as it can cause electrocution or fire
 - Do not put sharp or flammable objects in uniform pocket
- 👍 Strictly obeying work regulations
- 👍 Use appropriate personal protection kit
- 👍 Design machines that can replaced people in high risk tasks
- 👍 Implement working rules and regulations



EQUIPMENTS TO PROTECT YOU FROM PERSONAL INJURY



Wear safety goggles when working with dust to prevent irritation

Wear safety goggles with light filter when working with bright light
During Arc Welding, masks must be worn

Wear mask to prevent dust from getting into your nose

When wearing the mask, ensure that there is no space between your face and the mask

Wear gloves when performing arc welding

Helmet must be worn to protect your head Tie the strap under the chin
Cap can be used for low danger risk tasks

Ear plugs must be worn for tasks with loud noise
Plug into the ears

Belt must be worn when working in high places

Safety shoes must be worn to prevent feet injury

FACTORY'S STANDARD PIPELINE COLORS

	Green	Clean Water
	Red	Fire Fighting
	Black	Process Effluents
	Silver	Steam
	Orange	Electricity
	Yellow	Gasws
	Brown*	Oils
	Purple*	Acids / Alkalis

* The characteristics of each substance can be indicated by the different colors, which are used in conjunction with the standard pipeline colors.

SAFETY SIGNS

Color / Shape	Meaning	Usage Example
	Warning / Danger	Beware of harmful substances, Beware of high voltage, Beware of machinery hazard, Beware of sharp objects
	Required Actions	Required to wear personal protection equipments Required Sign / Recommend
	Safe Condition	Fire Escape, Emergency Exit, Emergency Line, Infirmary, Eye Wash Station/Emergency Shower
	Stop / Prohibited	No photograph, No Eating, No smoking, Do Not Go Straight, Stop For Inspection, Speed Limit

SAFETY REGULATIONS FOR SPECIFIC WORK

Proper Techniques for Moving Objects

- ▲ For the working area that is higher than 1.5 meters, a ladder or scaffold must be used
- ▲ A leaning ladder should be leaning at a 45 degree angle from the ground
- ▲ The end of the ladder must extend more than 60 cm. from the leaning point
- ▲ Should use non-slip ladder covers or rungs, or ask someone to hold the ladder
- ▲ If working above 4.5 meter in height, a helmet with chin strap, safety shoes, and leather gloves must be worn to prevent cuts or slipping



- ▲ Fasten the safety belt and attach to a strong and stable structure that can carry your weight. When climbing up the ladder, ensure that the base of the ladder is stable or ask the colleague to hold the base

Warning

- ▲ Workers with poor health condition should not work at height
- ▲ Workers who are scared of height (acrophobia) should avoid working at height

Proper Techniques for Moving an Object

The proper techniques for moving an object are as follows:

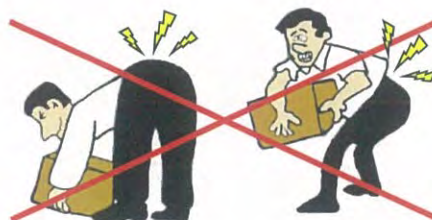


- Inspect the route and remove the obstacles
- Kneel down with your non-dominant knee, and put the dominant knee up perpendicular to the floor
- Hold the object tightly, keep your elbows close to the body and arms parallel to the floor
- Lift the object vertically, using strength from leg muscles
- Do not use the back muscles since it may result in an injury
- If the object is too heavy, seek help from other people or use supporting tool or equipment
- If the object is too large, there should be another person to tell the way



Maximum Weight Limit for Lifting at Horizontal Location

- Female employees: not exceeding 25 kilograms
- Male employees: not exceeding 55 kilograms



✿ How to Use Microscope

- Adjust the height of the chair to be appropriate with the height of the table
- Sit or stand up straight without having to stoop down or look up too much
- Rest your eyes regularly



Safety for Moving a Trolley or Hand Lift

1. For a trolley, push it forward. In case of a hand lift, pull it backward.
2. Do not place an object that is higher than the specified height because it will obstruct your vision or cause the object to fall down and become damaged. But if it is necessary and cannot be avoided to place the object higher than your eye level, use the pull back technique.
3. Stack up the objects and align them properly in a safe position.
4. Do not sit or ride on the trolley or hand lift.
5. Inspect the route, ensuring that there are no obstacles. While moving the trolley or hand lift, be careful that it does not bump into a person, walls, or other objects.



Safety for Using a Forklift

1. The driver must have received approval and passed the training according to the procedures.
2. Prior to each work, the condition of the forklift must be inspected. In case a damage is found, inform your supervisor immediately.
3. Prior to starting the engine, be sure to pull the handbrake and release the neutral gear.
4. Must comply with the traffic regulations and maintain speed at the rate specified by the factory.
5. While driving, do not put your hand or foot outside the mast.
6. Do not lift the fork while driving.
7. Select and use the pallet that is appropriate for the object that is to be lifted.
8. When loaded, drive the forklift by inclining the fork towards the front.
9. Do not use the forklift to push an object.
10. Do not load an object that is too high or weighs over the engine capacity, as specified by each model.
11. Do not allow any person to stand or walk pass the unseen or blind spots of the forklift.
12. Use the backrest and overhead guard when lifting high objects.
13. Do not use the forklift to transport passengers.
14. While parking, lower the forklift to the floor level at all times.
15. Check and inspect the forklift every time after usage.



Safety for Using Overhead Crane

1. The controller must have passed the training and received approval from the supervisor.
2. Prior to each usage, the overall condition of the crane must be examined with eyes.
3. Should check and test the activities of the control button of each function.
4. Should check the hoist, festoon, and cable or sling, as well as lifting equipment.
5. Should test the movement in all directions and operations of limit switches.
6. Should know the maximum weight limit of the load for that particular crane.
7. Should know the weight of the lifting object, as well as its center of gravity.
8. Should test the lifting (with 100% loaded or with maximum weight but not exceeding the limit) prior to each usage in order to test the functions and ability to lift. If any of the equipment or component of the crane is not fully functional, for instance, the brake motor is loose, causing the objects to keep moving downward, such issue must be completely solved for safety usage.
9. Lift or move the load with caution, ensuring that the load or the object does not swing or sway, since it may break the sling or the cable. When stopping the crane to drop the object, it must also be done with caution.
10. Upon usage, park the crane at the specified or safe area.
11. Upon usage, the hoist must be moved upwards, with small distance from the limit switch. Do not push and hold the limit switch, since this will make it less durable. In case the crane has an issue, notify the supervisor immediately to put up a sign to prevent others from using. Otherwise, it may cause danger to life and properties. The breaker should not be switched off at any time.
12. Should inspect, repair, and maintain the crane every month. Otherwise, there will be high risk of hazards or damages.
13. Should train new employees to have adequate knowledge and understanding of the instructions to using crane, both theoretically and practically. The user must also receive approval from the corresponding supervisor prior to using the crane.



Hand Signals for the Communication between Crane Users

Overhead Crane, High Crane, Tower Crane (In-House Crane)



Hoist

Bend the elbow perpendicularly. Point the index finger up and move in a circular motion



Lower

Spread your arm a little. Point. Point the index finger down and move in a circular motion



Trolley Travel

Make a right fist at a shoulder level. Point your thumb to the desired direction. Let the roller move horizontally.



Stop

Stretch your left arm out at a shoulder level, with palm faced down and keep the arm still.



Bridge Travel

Stretch your right palm out in front and at a shoulder level. Make the push gesture towards the desired direction that the bridge will move.



Emergency Stop

Stretch your left arm out at a shoulder level with palm faced down and swing back and forth in quick motion at a shoulder level.



Multiple Trolleys

Put your hand up at or above the head. Bend elbow at 90 degrees. Point index finger up to indicate Roller 1 (number shown on the roller). Point two fingers to indicate Roller 2. All other signals remain the same (such as hoist or lower).



Move Slowly

Put your arm, with palm faced down at a chin level. Use the index finger of the other arm and point to the center of the palm, slowly move in a circular motion.



Magnet is Disconnected

The controller stretches both arms out and beside the body, with both palms faced upwards.

Safety For Electrical Equipment Usage

1. Check the conditions of the electricity and electrical equipment. In case of damage or current leakage, repair or replace it immediately.
2. Put up the danger signs with explanations on the procedures in case of electrical accidents, as well as first aid and lifesaving. Such signs should be clearly visible.
3. For inspection, repair, and installation, a warning sign should be put on the switch or the safety key should be used to prevent the switch from changing its position.
4. If it is found that the electrical equipment is damaged, discontinue the use and inform the corresponding supervisor for the repair immediately.
5. Electric bulbs and all electrical appliances that produce heat should not be kept near clothes or any fuels that may cause fire.
6. All electrical appliances must have a ground wire to prevent danger in case of electrical leakage.
7. Turn off the switch of electrical tools or machines every time after use.
8. When working in a high voltage condition, personal protection equipment must be worn at all times, such as gloves and safety shoes.
9. Do not perform any electrical work without presence of related personnel.
10. All contractors must adhere to the Company's regulations for work safety.
11. When helping a victim to be freed from the electric current, do not touch him/her with bare hands; use dry cloth, wood, rope, or hose to pull the victim out. If the victim is unconscious, perform first aid by giving a CPR.



Safety in Office

Fall from a Chair

- Causes:
- ✧ Sway the chair to pick up a fallen object
 - ✧ Sway the rolling chair while sitting
 - ✧ Use your hands to pull the chair in order to sit without looking
 - ✧ Sway the chair to lay your legs on the table

Safety Procedures

- ✓ Be disciplined and avoid doing any activities that may increase the risk of you falling off the chair or causing the chair to tip over.

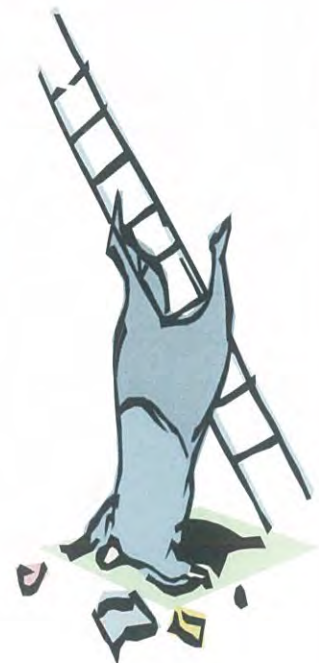


Fall from Heights

- Causes:
- Stand on the chair to pick or place an object
 - Stand on the ladder to pick or place an object
 - Lack of caution or being careless when picking an object

Safety Procedures

- ✓ Have someone to hold the ladder
- ✓ Securely fasten the ladder to prevent slipping
- ✓ Use a ladder that has standard quality
- ✓ Use a scaffolding that has standard quality
- ✓ Do not use a chair to pick an object



Fall Down the Stairs

- Causes:
- Lift too many objects that block the vision
 - Ladies who wear stockings and slippers may easily slip over

Safety Procedures

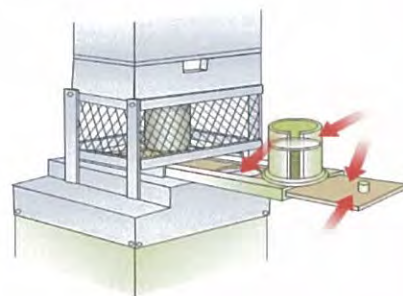
- ✓ Ensure that your vision is not blocked while carrying an object
- ✓ Wear your shoes tightly
- ✓ Use one hand to hold the handrail
- ✓ Walk in one single row and keep to the left
- ✓ Do not push each other on the stairs
- ✓ Do not talk or tease each other

Got Pinched

- Causes:
- Incorrect use of tools or equipment
 - Got pinched by the door
 - Got pinched by the drawer

Safety Procedures

- ✓ Use the tools correctly
- ✓ Install a door lock
- ✓ Do not place your finger on the drawer while closing



Dangers from Sharp Objects

- Causes:
- Keep sharp objects in a disorganized manner
 - Sharp objects do not have safety covers
 - Use unsafe equipment

Safety Procedures

- ✓ Broken glasses should be cleaned up immediately
- ✓ Be extremely careful when using a sharp object
- ✓ Keep sharp objects in a specific location
- ✓ Put on safety covers every time after use
- ✓ Do not point the sharp point of the object towards others



Slip Over

- Causes:
- Wet or dirty floor

Safety Procedures

- ✓ Clean the floor regularly
- ✓ When spilled water, clean up the floor immediately
- ✓ Should not carry wet umbrella into the workplace
- ✓ Place floor towels at the entrance/exit



Trip Over

- Causes:
- Wires or cables are blocking the walkway
 - Floor gaps and cracks

Safety Procedures

- ✓ Electrical appliances should be placed close to the socket
- ✓ Wires on the floor should be rubber-coated



- ✓ Wires and cables must be taped
- ✓ Should not have temporary wires that are blocking the walkway
- ✓ Repair floor gaps and cracks



Kick

- Causes:
- Objects are blocking the walkway
 - Misplace the object



Safety Procedures

- ✓ Put the object in place
- ✓ Do not put objects disorderedly on the floor
- ✓ Check the walkway to ensure safety at all times
- ✓ Caution your colleague when he/she left the drawer open
- ✓ In case the object was moved, should check its original location
- ✓ Falling objects should be kept back into place
- ✓ Put up a clear sign when floor levels are different
- ✓ Carpet seams should be taped properly

Crash

- Causes:
- Desks are placed too close to each other
 - Desks are placed at the entrance/exit
 - Cupboards are left open



Safety Procedures

- ✓ Desks should be placed at least 60 cm. away from each other
- ✓ Should not place a desk at the entrance/exit
- ✓ Keep the objects nice and tidy
- ✓ Close the cupboard at all times after use

Bump

- Causes:
- Bump to each other while walking
 - Unconscious, inattentive, and careless
 - Blind spot



Safety Procedures

- ✓ Should not run in the workplace
- ✓ Keep to the left when walking
- ✓ Stand outside the radius of the opening door
- ✓ Place a mirror at the blind spot
- ✓ Do not walk close to the corner at the blind spot

Got Hit by Falling Objects

- Causes:
- Place the object on the cupboard
 - Place or arrange objects disorderedly
 - Place heavy objects on the cupboard

Safety Procedures

- ✓ Do not place objects on the cupboard, such as glassware and sharp objects
- ✓ If necessary to place them on the cupboard, put them in a box that is not too high
- ✓ Do not place heavy or dangerous items
- ✓ Keep the objects nice and tidy



Got Crushed by Falling Objects

- Causes:
- Unstable or poor installation
 - The drawer is pulled out too far
 - Pull out multiple drawer trays at the same time
 - Hang onto or put too much weight on the drawer
 - The drawer lock is broken

Safety Procedures

- ✓ Place or install the drawer properly, ensuring that it is stable
- ✓ Open one drawer tray at a time
- ✓ Check the drawer locks at all times
- ✓ Do not hang onto or put weight on the drawer
- ✓ Put heavy objects in the lowest tray
- ✓ Do not pick or reach for an object that is too high



Safety for Using Tools

Proper Use of Tools

- ☺ Select the size, weight, and type of the tool that is appropriate to the work
- ☺ Clean and keep the equipment or tool in appropriate place after use
- ☺ In case of damaged tools or machinery, discontinue use, cut off the power switch, put up the sign "Damaged - Do Not Use", and send for repair immediately
- ☺ When under repair, put up the sign "Under Repair - Do Not Turn On the Switch"
- ☺ Do not use wrong type of tool or machinery
- ☺ Do not carry sharp objects after work



Safety for Machinery-Related Work

1. Do not use the machine without the staff being present or if have not passed the training
2. Use the machine with caution and follow instructions on the manual or the specified procedures
3. Do not disassemble any safety tools or covers from the machine
4. Wear safety equipment that is appropriate to the work
5. Do not place your hands or any parts of the body close to the spinning, clamping, or moving parts of the machine
6. While the machine is operating, do not try to clean or pull out the stuck items from the machine without turning it off
7. Wear tight clothes. Do not wear any accessories that may get pinched or pulled by the machine
8. While inspecting or repairing the machine, put up the sign and the lockout-tagout at all times
9. Prior to work, check and ensure that the machine is in a good condition
10. If the machine or safety tools or covers are damaged or lost, inform the supervisor immediately



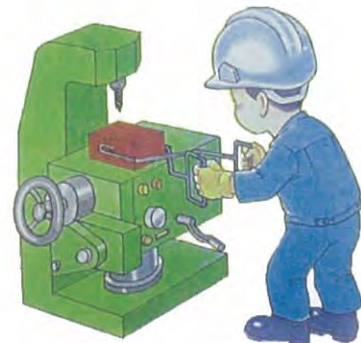
Press Machine

- ✘ Use the press machine that has been installed with safety equipment
- ✘ Ensure proper functioning of switches and safety equipment prior to starting the machine
- ✘ Keep your hands away from the mold before pressing the switch
- ✘ After running the machine, do not modify anything within the pressing area
- ✘ In case of repair or modification, ensure to close the switch at all times
- ✘ The installation, movement, or modification of the machine must be performed with safety precautions by trained individuals



Drilling Machine

- ✘ Do not wear gloves when working on a drilling machine
- ✘ Wear safety goggles at all times
- ✘ Hold the workpiece firmly to prevent the drill bit from breaking
- ✘ Do not use your hands to sweep away the scrap.
Use the brush to clean.



Lathe Machine

- ✘ Wear safety goggles at all times
- ✘ Do not touch the workpiece or scrap metal with your hands, since they are extremely hot
- ✘ The coveralls must not be made from synthetic fabrics, since it may cause fire
- ✘ Do not place tools or objects on the carriage
- ✘ Do not measure the workpiece while the lathe machine is rotating
- ✘ Do not pull out the scrap metal from the workpiece, particularly when the machine is lathing



Safety Procedures for Work that May Cause Fire Sparks



Welding Work

1. Prior to welding, prepare safety equipment that is appropriate to the work, such as goggles, leather gloves, leather arm sleeves, and cloth mask to prevent welding fumes
2. Prior to welding, ensure that there are no flammable objects in the welding area
3. Welding of materials that contain flammable substances, such as a gas tank, must be cleaned thoroughly. Ensure that there are no vapors of the flammable substance left over
4. Welding of materials that are toxic to the body, such as lead or galvanized steel, must have an exhaust hood or air purifier or ensure appropriate air circulation because the welding fumes are dangerous to health
5. The welding machine must be properly connected to the ground rod
6. Welding cables must be in a good condition, with thick joints and must be fully insulated
7. While operating, the welding cable must not be immersed in water
8. If required to perform welding in a damp area, rubber shoes must be worn and insulated material must be placed on the floor around the welding area
9. When conducting welding at height, ensure to wear a safety belt and attach it with a secured object at all times
10. Welding work at height should have a fireproof fabric or fire tray to prevent falling fire splash
11. Keep the fire extinguisher in the working area at all times
12. Do not look at the welding arcs and flames with naked eyes
13. Upon completion of the welding, turn off the power switch immediately
14. Before leaving the work, check the welding area to ensure that there are no splashes on fire



Grinding Work

- ✿ Safety goggles must be worn at all times prior to each grinding work
- ✿ Ensure that the tools and equipment are in a safe condition. The grinding machine must have a protective cover to prevent scrap metal
- ✿ Turn off the switch and pull the plug from the outlet before changing the grinding disc
- ✿ The grinding stone cover must be adjusted appropriately to allow space for grinding
- ✿ The grinding disc must touch the axle and the flang must be held firmly
- ✿ The work rest must be perpendicular with the grinding direction
- ✿ The user must wear protective goggles and the grinding plate must have a protective cover to prevent scrap metal



Welding or Cutting Containers that Contain Flammable Substances or Gas

- ✧ Must clean the flammable substances or gas that are left over in the container
- ✧ Ventilate air in the container to ensure that there are no flammable substances or gas left over, or the lower explosive limit should be 0% prior to welding
- ✧ Install enough fire extinguisher near the working area that can be easily accessed in case of emergency
- ✧ Keep a safe distance between the gas tank and the welding area to prevent fire splashes. The gas tank must be placed firmly to prevent it from spilling
- ✧ Check all equipment to ensure that they are in good condition prior to the work
- ✧ Electrical welding equipment must be in a good condition
- ✧ When removing the welding rod to suspend or stop the machine, turn off the power switch at all times
- ✧ Fuse of the electric welder must have appropriate size and must be installed properly
- ✧ Do not switch the air hose between gas hose because it may cause an explosion
Should check and ensure that the air hose, gas hose, and flashback arrestors are in a good condition
- ✧ Must wear safety gloves and goggles or mask when working at all times
- ✧ Upon completion of work, check around the welding area to ensure that the fire splashes are not on fire



Safety in Using Chemicals

- All chemical-related work must be performed by a specialist or related personnel or who is responsible for putting labels on packages or all chemical containers
- Prior to each usage, read the labels, instructions, chemical hazards, and monitoring process and must strictly comply with the procedures
- Take the portion out only in the amount that is necessary
- Must wear appropriate personal protective equipment when working
- After finished working, wash your hands and body, and clean the area every time
- Close the lid of the chemical containers immediately after use and keep them in a cupboard/chemical storage room or in a cool place with good air ventilation, away from power source
- When removing chemical substances, use a rubber bulb or a suction pump and a spill tray to prevent chemical spills



Procedures When in Contact with a Chemical Substance

- Chemical splash in the eye
 - Go to the nearest emergency eyewash station
 - Wash with clean water for at least 15 minutes (keep your eye open at all times while the water is running through)
 - Visit a physician and nurse immediately
- Chemical splash/spill to the skin
 - Clean the affected area for at least 15 minutes
 - Remove all contaminated clothing. If severe, wash with water again
 - Visit a physician and nurse immediately
- Chemical leakage
 - Examine the degree of chemical hazards and amount of leakage
 - Wear safety equipment that protect from chemical hazards
 - Prevent the spread of chemical vapors or leakages
 - Clean the area using safety absorbant or other appropriate equipment
 - In case of large amount of leakage, report supervisor or manager immediately
 - Proceed according to the emergency action plan of the Company



Motor Vehicle Safety

Before driving a motor vehicle:

- ⌚ Ensure that the motor vehicle is in a safe condition for use
- ⌚ The driver should be mentally and physically healthy
- ⌚ Fasten your seat belt or wear a safety helmet when driving at all times
- ⌚ Drive at a safe speed and adhere to the traffic regulations
- ⌚ Increase precaution in the presence of heavy traffic or slippery road
- ⌚ Give signals ahead of time before changing or turning lanes
- ⌚ Check your surrounding for other vehicles before changing lanes
- ⌚ Keep a safe distance between the vehicles
- ⌚ Contemplate future events when at an intersection or road curve
- ⌚ Do not drive impetuously
- ⌚ Do not drink and drive or in the event of a lack of self-control



Safety for Contractors

1. Dress appropriately according to the nature of work
2. The supervisor must control and oversee the operations of the workers at the work site
3. A warning sign must be presented at the construction site to prevent danger
4. Contractors must wear appropriate personal protective equipment
5. For work at 4 meters in height or above, there must be scaffolding, guard rail, and safety net to prevent workers and objects from falling from heights
6. When working at height using forklifts or other equipment, the lifting operations must be performed in the direction that is free from people and machinery. There must also be a danger sign and the supervisor must be presented at all times
7. Prior to performing a machinery testing, the supervisor must be informed every time
8. Must strictly comply with the Company's safety regulations
9. The supervisor and/or safety officers and/or controller and/or factory's security officers have the right to give warnings or suspend the operations in case of dangerous events or violation of the factory's safety regulations



Safety for Work at Height**A. Standard Regulations**

1. Must be the assigned person and has qualification in working at height
2. Must dress appropriately and neatly
3. Must ensure that there is sufficient lightness in preparation for work
4. Wear personal protective equipment while working at all times, including oil-resistant gloves, safety shoes, and safety belt

B. Regulations for Getting up to the Construction Site

1. When going up/down the vertical ladder, there should only be one person
2. The ladder must be fixed and stable
3. While going up/down the ladder, hold the edges of the ladder with both hands and climb up/down at a normal speed
4. Do not hold any tools or equipment while climbing up/down the ladder.
Any necessary tools or equipment must be kept in a pouch that is attached to a belt

C. Regulations for Working at Height

1. Do not work at height alone
2. Do not move at a fast pace when working at 2 meters or more above ground
3. Do not throw objects or equipment to those at the upper level
4. Do not throw objects or equipment to those at the lower level or on the ground
5. For cutting/welding work at height, must inspect and relocate all fuels and flammable substances to the ground level prior to performing the work.
Be cautious while cutting/welding.
6. The supervisor must ensure that nobody walks past below the working area
7. Be careful of getting hit by the hanger in case of working in the pathway of the hanger
8. While standing on the roof tiles, do not directly step on the tiles

Fire Safety and Prevention

There are 3 components of fire:

1. Heat
2. Fuel
3. Oxygen



These components, when combined in an appropriate ratio, can create fire. Therefore, in order to extinguish the fire, one of these components must be eliminated. The preventive measures are:

- ♦ Flammable substances or fuels must be kept away from heat and in an appropriate and safe area. Should not keep in excessive amount.
- ♦ All flammable substances must be kept in a safe place with good air ventilation, and away from heat and fire spark. There should be a fire extinguisher in the storage area
- ♦ Do not smoke in the area that has flammable substances or fuels. Must only smoke in the designated area
- ♦ In the event of fire, if able to extinguish the fire by yourself, put out the fire immediately and inform the supervisor and safety officer
- ♦ If unable to extinguish the fire, notify the supervisor/shift leader to proceed according to the emergency action plan and evacuate the area immediately
- ♦ Do not place objects in the area that blocks the access to the fire extinguisher
- ♦ Should study the location of fire extinguishers and emergency exit at the workplace
- ♦ Do not use the fire extinguisher or take it out from its storage when not necessary
- ♦ There should be no objects or obstacles blocking the emergency exit and the walkway
- ♦ Do not use the elevator in case of fire
- ♦ In case of electrical fire, do not use water to extinguish the fire until the power has been cut off and after receiving an order from the fire safety director
- ♦ In the case that the work causes heat or fire splash, such as welding, ensure to inspect the surrounding area for possible fuels and must obtain the work permit prior to each work



Causes of Fire

The causes of fire and the spread of fire at the workplace that may cause damages to the environment or nearby communities comprise of 2 main elements:

- Arson or intention
- Mistake, defect, or negligence

Effects of Fire

Fire at the factory or workplace results in various effects, as follow:

1. Life Safety
2. Property Safety
3. Business Safety
4. Environmental Safety

Fire Extinguisher Guideline

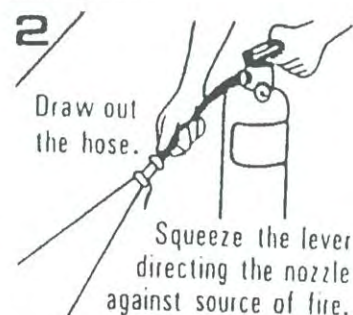
The fire extinguisher must be used only in case of fire and with the following procedures:

Fire Extinguisher

1. Check if the gauge indicator is in the position that can be used
2. Pull out the safety pin and perform spray testing
3. Hold the hose tightly and direct the nozzle to the source of the fire by standing in the windward position and about 7-8 feet away from the fire
4. Spray the liquid at the source of the fire and must be 1 foot away from the fire.

Slowly move the nozzle around

5. Spray until the fire is extinguished. Slowly step away with caution to prevent the fire in case of reoccurrence



Emergency Condition

Emergency Condition Procedures

1. In Case of Fire

- 1.1 The worker or encounter should assess the situation whether they can extinguish the fire by themselves or not.
 - If that is the case, put out the fire using the fire extinguisher or the safest procedure, and inform the supervisor immediately
 - Shout to let the colleagues know of the situation
- 1.2 The fire extinguishing team arrives at the area, assess the situation and cease the fire immediately.
 - If the fire has been extinguished, report the supervisor immediately
 - If not, notify the fire safety director
- 1.3 The fire safety director announces emergency condition and implements the fire evacuation plan.
- 1.4 All employees evacuate and follow the leader. Congregate at the assembly point safely and as fast as possible.
- 1.5 The leader examines the number of employees under his/her responsibility.
 - The number is matched; every one stays at the assembly point until the next order
 - The number does not match; order the rescuers to find the missing persons
- 1.6 All workers and external persons must strictly comply with the emergency action plan.



2. In Case of Chemical Leakage

- 2.1 In case of a small amount of leakage, the encounter must proceed immediately.
 - 2.1.1 Wear appropriate personal protective equipment
 - 2.1.2 Check the chemical labels, including MSDS
 - 2.1.3 Use appropriate items for each type of chemicals, such as cloth or sand to absorb chemical leaks
- 2.2 In case of a large amount of chemical leakage:
 - 2.2.1 The encounter must report the supervisor immediately
 - 2.2.2 If there is a possibility of fire or explosion, report the fire safety director and proceed with the emergency action plan



3. In Case of Boiler Explosion

- 3.1 In case of abnormal functioning of the boiler that may cause danger, report the boiler controller
- 3.2 If unable to stop the operations of the boiler and there is a possibility of explosion, report the fire safety director and proceed with the emergency action plan

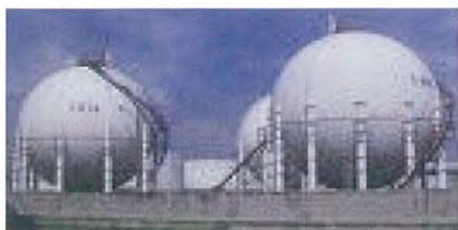


4. In Case of LPG Gas Leakage / Explosion

- 4.1 In case of an indication of LPG gas leakage or explosion, report the supervisor immediately
- 4.2 Observation should be performed at a one-meter distance. Do not get too close.
- 4.3 Stop the supply of LPG gas. Do not start the engine and do not smoke.
- 4.4 If there is a possibility of fire or explosion, report the fire safety director and proceed with the emergency action plan

5. In Case of Stabilization Pond Malfunction

- 5.1 In the event of an overflow of wastewater from the wastewater treatment system, block the flow of wastewater using a remnant of cloth. Inform the supervisor and the wastewater treatment controller immediately
- 5.2 Turn off the valve to prevent water from flowing into the stabilization pond
- 5.3 Absorb the wastewater with oil absorbent cloth and sand or suck the wastewater into a 200-liter container. In case of large amount of wastewater, contact external agency.



First Aid

First Aid for Cuts or Wounds

In case of a minor cut or abrasion (not much blood)

- ✦ Squeeze the blood out
- ✦ Wash with clean water and soap
- ✦ Apply iodine tincture or betadine on fresh wound
- ✦ Close the wound or join wound edges together



In case of a major wound or wound with exposed bone

- ✦ Stop the blood immediately
- ✦ Cover the wound with clean cloth.
Do not relocate the bone
- ✦ Take the victim to a physician immediately



In case of a stab wound caused by a sharp object, knife, or wood

- ✦ Cut the stabbing knife or wood to make it shorter and more convenient when traveling to a hospital (do not pull it out)
- ✦ Stay still
- ✦ Take the victim to a hospital immediately

First Aid for Eye Injuries

Chemical Eye Burns

- ✦ Do not rub the eye. Wash with clean water
- ✦ Visit a physician immediately

Got Stabbed in the Eye

- ✦ Close the eye
- ✦ Cover the eye with gauze or handkerchief
- ✦ Limit eye movement
- ✦ Visit a physician immediately

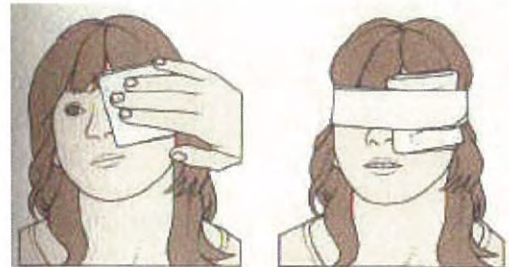


Foreign Bodies in the Eye

- ✦ Rub the eye gently and blink regularly. Then wash the eye or look up
- ✦ Use the corner of the handkerchief to remove the dust
- ✦ If unsuccessful, seek medical attention

Got Hit in the Eye

- ✦ Apply a cold compress immediately
- ✦ Seek medical attention immediately



First Aid for Broken Bones and Fractures

- ✦ Place the injured body part on a wooden sheet or thick book
- ✦ Wrap with a cloth to restrict movement
- ✦ If the injury occurs at the end of the arm or hand, sling the arm with a cloth



First Aid for Electric Shock

First Aid For Electric Shock Victims By CPR

1. Examine



- Check the breathing



- Check the pulse

2. Open Airway



3. Give 2 Full Breaths



4. Massage the Chest



- Place hands between the chest, slightly above the xiphoid



- Press the chest about 1.5-2" in depth for 15 times (1 sec. each time)

5. Continue Giving the CPR until Reaching a Physician



- One helper gives 2 full breaths and massage the chest 15 times



- 2 helpers give 1 full breath and massage the chest 5 times

First Aid for Burns

- Remove or cut any clothing from the burned area
- Do not remove any clothing that sticks to the wound if the fire has been put out
- Remove all accessories, such as ring, belt, watch, and shoes (since it may be expanded and difficult to be removed)
- Cool down the burned area as soon as possible (at least 10 minutes)
- Cover the wound with a sterile gauze. In case of a large wound, cover with a cloth loosely

First Aid for Sprains

- Keep the sprained area still and lift it up high
- Apply a cold compress immediately to reduce pain and swelling
- In case of post-swelling, apply a hot compress or massage with a balm or wintergreen oil
- In case of severe pain or swelling, seek medical advice immediately

Procedures for Investigation, Analysis, and Report of Accidents

1. In the event of an accident, the victim or witness must report the supervisor and the safety officer and bring the victim to an infirmary immediately to receive the first aid
2. The supervisor immediately investigates the accident with the safety officer
3. The supervisor records the investigation of the accident / incident and submit to the safety officer
4. The safety officer prepares the accident report and submit to the manager, along with providing advices and proposing preventive measures to resolve the accident
5. The safety officer follows up with the results in resolving the accident



Special Safety Manual For Section Heat Treatment

Hazards from working with heat

Workers who work for a long period of time in the presence of heat may experience 2 types of danger:

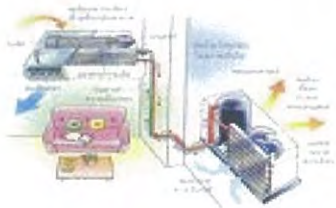
1. Acute danger such as fainting, high body temperature, skin redness, fatigue, muscle cramps, and dehydration. In addition, heat also affects mental condition that includes bad temper, reduced productivity, and loss of appetite.



2. Chronic danger such as lower ability to endure heat, prone to fainting and fatigue, and increased risk of kidney stones.

Control and prevent dangers from heat

1. The control and prevention of the source of heat include insulation coverage, insulated wall panels, and ventilation system for specific areas.



2. The environmental control and prevention include the design and construction of a building with a sound ventilation system and the availability of coolers at the working area.



3. The personal control and prevention include regular health check-up of workers, selection of workers prior to the recruitment, and the use of personal protective equipment.



Causes of muscle cramps

1. Inadequate blood supply, such as wearing socks too tightly or while in an extremely cold place
2. Mineral deficiency such as sodium and calcium that are depleted through sweating
3. Injury that causes muscle contraction
4. Severe muscle contraction that may be caused by excessive exercise or inappropriate sitting, sleeping, or

Muscle cramps that occur at various body parts at the same time are usually caused by lack of water, food, or minerals in the muscles.

Muscle cramps that are caused by muscle contraction can be relieved by stretching the muscles in the direction of its functions.

The body parts where muscle cramps typically occur include calf muscles, front and back thigh muscles, and back muscles. However, the majority of people experience cramps at the calf muscles.



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First Aid for muscle cramps

Normally, the contracted muscles will eventually become relaxed by its nature. But there are ways to speed up the relaxation process, which include:

1. Slowly stretch the cramped muscle. In case the cramp occurs at the calf muscle, stretch out the foot and pull the end of the toes towards the knee and gradually increase the pulling force. This would help to stretch the calf muscles.
2. Apply a warm compress or massage gently with a balm or wintergreen oil to increase blood circulation and relax the muscles
3. Keep the injured person warm and let him/her drink salt water to help the muscles relax

Fainting

Fainting is a temporary loss of consciousness that is caused by temporary insufficient blood supply to the brain. Early symptoms include apathy and dizziness, with pale and cold skin. These symptoms may occur without the loss of consciousness. In addition, a sudden shock or low blood sugar may lower the blood pressure, which may lead to fainting. In the event that a person faints, lay him/her down and raise both legs above the heart's level. Ensure that the area is well-ventilated. If the fainted person becomes conscious within 2-3 minutes, with no other complications, there should be nothing to worry about. However, if fainting regularly occurs or there are other complications, it is necessary to seek medical advice. In the event of long period of unconsciousness or difficult or irregular or abnormal breathing, bring the fainted person to a hospital immediately. While on the way to a hospital, ensure to position the person semi-facedown to prevent airway blockage.



Hazards from methanol

Inhalation : results in the irritation of eyes, nose, throat, and respiratory tract. Suppress the central nervous system, causing headache, dizziness, and sleepiness. In case of inhaling large amount of methanol, it may result in coma and eventually death due to respiratory failure.

Skin Contact : methanol vapor removes the skin sebum, causing dry, scaly skin and rashes.

Ingestion : results in the irritation of oral mucosa and throat, causing coughing, diarrhea, stomach pain, headache, apathy, and sleepiness.

Eye contact : results in irritation, inflamed mucosa, and redness of the eye, as well as blurry vision.

First Aid

Inhalation : move the patient to the area with fresh air. If the patient stops breathing, perform the CPR. In case of difficulty in breathing, provide oxygen for support. Bring the patient to a hospital immediately.

Ingestion : If the patient is conscious, let him/her drink 1/2-1 glass of water to dilute the substance. In case of vomiting, lower the head down to prevent inhalation of the vomit. Gargle with clean water and bring the patient to a hospital.

Skin Contact : wash the skin with water immediately for at least 15 minutes. Remove all contaminated clothing and shoes. Wash the contaminated clothing and shoes prior to wearing. Bring the patient to a hospital.

Eye Contact : rinse the eye with clean water immediately for at least 15 minutes. Open the eyelid widely while rinsing. Bring the patient to a hospital.

Personal protective equipment



Carbon Monoxide Gas effects on the body

When the carbon monoxide gas enters the body through respiratory system, it will intoxicate the body because it will replace oxygen in the blood stream, restricting the body from using oxygen. Regular inhalation of carbon monoxide in a small amount will cause headache, nausea, blurry vision, confusion, hallucination, weakness, rapid heart rate, and fainting. Severe symptoms include spasm, slow heart rate, slow breathing, and death. In case of the inhalation of carbon monoxide in a large amount at once, early symptoms may be minor before the patient becomes unconscious and passes away, with the inability to help him/herself.

Carbon monoxide gas will not be accumulated in the body like other heavy metals such as lead and manganese. Therefore, if the body receives carbon monoxide gas in a small amount, it can eliminate the gas from the blood stream within 8-10 hours.



Prevention of carbon monoxide gas

1. Reduce the amount of carbon monoxide that is created by the combustion of fuel in various engines, such as forklift, by maintaining the engine in a good condition.
2. Install air vacuum pump at specific areas, such as around the engine or equipment that creates carbon monoxide. In addition, ensure that the factory has a good ventilation system in order to prevent the accumulation of carbon monoxide.
3. If unable to improve the surrounding environment in a safe condition, workers must wear a mask that is specifically used for preventing carbon monoxide.

Confined Space Definition

It refers to an area with limited air movement or ventilation that is inadequate for hygienic and safe condition of the area, such as tunnel, cave, pit, pipeline, underground room, vault, oil tank, hopper, silo, equipment or other objects with similar characteristics.

Causes of injury and death

About 60% of deaths in a confined space are caused by oxygen deprivation and lack of inspection of the air quality prior to the work or the rescue. Therefore, 50% of the deaths are the rescuers.

Injuries and deaths have 4 major causes:

- (1) Oxygen deprivation or overabundance
- (2) Fire burn, electrocution, heat, or explosion
- (3) In contact with intoxicated substance or gas, dust, etc.
- (4) Drowning or falling into a tank that contains liquid substances



Prevention and important measures for working in a confined space

1. Check the volume of air and measure the contamination of intoxicated substances prior to working in a confined space. The oxygen level must be above 19.5% but not exceeding 23.5% (according to the Ministerial Regulation, on the prescribing of standard for administration and management of occupational safety, health and work environment in confined space, B.E. 2547)

2. Improvement on the ventilation system. In the event that the confined space is contaminated with hazardous substances or has inadequate or too much level of oxygen, the ventilation system must be improved. The area within the confined space must be cleaned thoroughly and regularly.

3. There must be at least 3 workers in a confined space, with one person conducting the work, another person waiting at the entry or exit, and the other person waiting outside in case of emergency. The responsibilities must be clearly assigned to each worker, whereby all workers must have passed the training regarding confined space safety.

4. Prepare personal protective and rescue equipment. In particular, the worker who has to enter a deep pit must wear a complete personal rescue equipment, with additional equipment for pulling oneself up from the bottom of the pit. Wrist cuffs may be used in the case that the mouth of the pit is small and narrow.

5. Regular control, measurement, and announcement of potential dangers, including putting up a danger sign and regulations for working in a confined space, and enforce strict rules to ensure workers' compliance with the safety regulations.

Special Safety Manual For

Section Header, Rolling, and Machining

All noises that we hear today help us go on with our daily lives, as well as seek entertainment in life. Each noise creates sound at a different level, which may be harmful to our health.

แหล่งกำเนิดเสียงที่สำคัญ	
ระดับเสียง (เดซิเบลเอ)*	แหล่งกำเนิดเสียง
30	เสียงกระซิบ
50	เสียงพิมพ์ดีด
60	เสียงสนทนาทั่วไป
70	-
80	เสียงจราจรตามปกติ
90	-
100	เสียงชุดเจาะถนน
120	เสียงค้อน เครื่องปั๊มโลหะ
140	เสียงเครื่องบินขึ้น



dB(A) is the scale of a sound level meter that imitates the functions of human's ears. It will filter out the sounds that have frequencies outside the range of human hearing.

Harmful Noise Level The World Health Organization defined harmful noise as a noise with dB level of over 85 decibels. Many factories are found to have a noise with dB level of over 85 decibels, which may cause damage to both physical and mental health.

Noise Disturbance refers to the level of noise that the listener does not want to hear because it may affect emotions and feelings. Although it does not exceed the noise safety criteria, it may disturb the listener. Since emotional effect is more difficult to measure, it is harder to identify whether a particular noise is a disturbance or not. For instance, noises on the dance floor will not make the listeners feel as if they are disturbed. However, for places that require silence such as a library, a noise level of 60 dB(A) may be regarded as a disturbance.



Negative Consequences of noise that affects physical and mental health:

1. Create annoyance and bad temper, resulting in stress
2. Disturb sleep cycle and communication
3. Reduce concentration and productivity. In case of a very loud noise, it may result in errors or laggard that consequently leads to an accident
4. Affect mental health and stress, as well as physical health such as gastritis and hypertension
5. Prolonged exposure to harmful noise may lead to hearing loss, which might be either temporary or permanently



Prevention and Procedures for Noise Level Reduction

1. Control of the source of noise



- ✦ Design the equipment, tool, and machinery to produce low level of noise
- ✦ Select the type of equipment or tool that produces low level of noise, such as using hydraulic pump rather than mechanical pump
- ✦ Change to the manufacturing process that does not cause loud noise
- ✦ Prepare a soundproof enclosure surrounding the machine. The enclosure must be fabricated from noise absorbent lining
- ✦ For installation, place the machine in a stable position. Since noises are caused by vibration of the machine, the use of vibration isolators may reduce the noise
- ✦ Regular maintenance of equipment, tool, and machinery, such as cleaning and adding lubricants to reduce frictions of the machine

2. Control of the pathway of noise

- Increase the distance between the machine and the listener. This will reduce the level of noise by 6 dB for each distance that is increased by two times
- Build a room or partition to block the noise pathway, using soundproof material or noise absorbent that corresponds to the noise frequency
- Plant a shade tree by the fence to reduce noise level

3. Control of the listening process

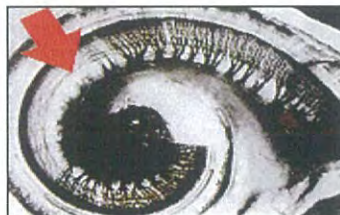
- Use hearing protection equipment to reduce the loudness of noise. This consists of two types, which include an earmuff that covers the entire ear and ear lobe and can reduce the level of noise by 20-40 dB(A)
- An earplug that is either made from rubber or plastic can reduce the level of noise by 10-20 dB(A)
- Limit the amount of time exposed to harmful noises or noises that exceed the safety criteria

-
- Diagram illustrating the anatomy of the human ear with labels in Thai:
- ใบหู (Outer Ear)
 - กระดูกหู (Ear Bones)
 - เยื่อแก้วหู (Eardrum)
 - ประสาทรับเสียง (Hearing Nerve)
 - คอหอยรูปรูปหลอด (Pharynx)

is an important organ for hearing. Without proper care, it may result in a loss of hearing or deaf. Working in an area with loud noise for a long period of time will cause the hair cells in the spiral organ of the inner ear to be damaged and die, causing tinnitus or deaf. Once the hair cells are dead, they cannot be treated or repaired, which results in hearing loss.



Hair Cells



Damaged Hair Cells

The Use of Earplug

Insert the earplug into the ear by reaching the hand (that is in the opposite side of the inserted ear) over your head and gently pull the top of your ear up and back, while holding the stem with the other hand. Insert the earplug well inside the ear canal. Initially, it may be annoying. Therefore, you should start wearing the earplug for 10-30 minutes. Then, gradually increase the length of time of wearing according to the below schedule. After 5 days, if you still feel uncomfortable, change the type of earplug.



Day	Length of Time of Wearing Earplugs	
	Morning	Afternoon
1	30 minutes	1 hour
2	1 hour	1 hour
3	2 hours	2 hours
4	3 hours	3 hours
5	4 hours	4 hours

Information About Noise

The Department of Employment, Ministry of Interior, stipulated the criteria and regulations on the harmful level of noise at a workplace as follows:

1. For continuous noise exposure of less than 7 hours per day, the level of noise should not exceed 91 dB (A)
2. For continuous noise exposure between 7-8 hours per day, the level of noise should not exceed 90 dB (A)
3. For continuous noise exposure of more than 8 hours per day, the level of noise should not exceed 80 dB (A)
4. The employer is not allowed to assign the employee to work at a place with more than 140 dB (A) of noise

The long-term effects of working at a place with the noise level exceeding 85 dB (A) and for a continuous period of more than 8 hours per day include:

1. **Physical Health** - direct damage to the auditory nerve system, causing loss of hearing either temporary that may consequently lead to disability.
2. **Mental Health** - stress may lead to mental disorder or neurosis. Emotional changes may lead to gastritis, hypertension, or permanently and thyrotoxicosis.
3. **Productivity** - loud noises will cause distraction, resulting in loss of concentration that further leads to accidents and lower productivity.



Danger from Working with Chemicals, Oil Mist, Mineral, and Hydraulic Oil

Usage :

Liquid that is used in metal work, used as diesel fuel or nuclear fuel, used in paper production, used in the extraction process

Information on Danger :

Eye irritation

Health Effect :

Inhalation : cause irritation to the respiratory system, resulting in coughing, rapid breathing, chest burn, headache, fatigue, anxiety, loss of control, apathy, and coma

Skin Contact : cause irritation to the skin, resulting in redness, rash, itchiness, and swelling that lead to skin inflammation

Eye Contact : cause irritation to the eye and severe pain



First Aid

Inhalation : move the patient to the area with fresh air. If the patient stops breathing, perform the CPR. In case of difficulty in breathing, provide oxygen for support. Bring the patient to a hospital immediately.

Ingestion : Do not induce vomiting. In the event that the patient vomits by him/herself, position the head to be lower than the hip to prevent inhalation of vomit into the lungs. Bring the patient to a hospital immediately. Ensure that nothing enters the mouth of unconscious patient; take the patient to a hospital.

Skin Contact : wash the skin with water immediately for at least 15 minutes. Remove all contaminated clothing and shoes. Wash the contaminated clothing and shoes prior to wearing. Bring the patient to a hospital.

Eye Contact : rinse the eye with clean water immediately for at least 15 minutes. In case of eye irritation or other complications, take the patient to a hospital immediately.

Storage and Handling

- N Completely close the lid of the container
- N Keep outside of the building or keep separately and correctly
- N Storage and working areas should not be close to a smoking area
- N Use tools and equipment that do not create fire splash
- N Observe all warning signs and precautions that are specified for each substance



Control of Substance Contact / Personal Protective Equipment

Engineering Control: ventilation fan, emergency shower, and eye wash station must be available



Gloves



Goggles



Mask

Diseases that are Caused by Working with Chemicals, Oil Mist, Mineral, Hydraulic Oil

Related Diseases: lung cancer, skin cancer

Lung Cancer

Causes:

1. Cigarettes are regarded as a major cause of lung cancer, since it contains various chemical substances that are produced by the combustion of cigarettes; these chemicals are carcinogens.
2. Chronic inflammation of lung, such as pulmonary tuberculosis. Even after treatment, there is the possibility of the development of cancer at the same location.
3. Chronic tracheal and lung irritation that are caused by dust in a factory. It is not relatively common as compared to cigarettes. It includes dust from coal and oil, lead, volatile solvents from melting copper and zinc, asbestos, nickel, chromium, and arsenic.

Symptoms

Respiratory symptoms include congested breathing, chest tightness and pain, chronic coughing, hemoptysis or hoarse voice, chronic lung or tracheal inflammation, and in some cases, weight loss with unknown cause.

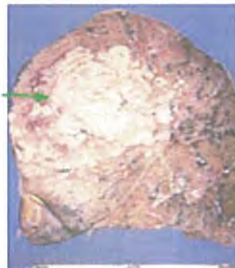
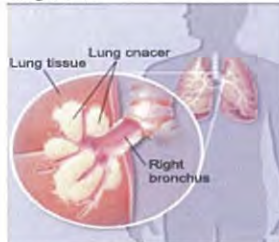
Treatment

Most patients in the first stage are treated with surgical procedures. In later stages, treatment include radiation therapy or chemotherapy.

Precaution

1. Do not smoke cigarettes and avoid being in the area where people smoke cigarettes
2. Workers in a factory or mine should wear a mask to cover the nose to prevent inhalation of dust
3. Those who have high risk of cancer, such as smokers, workers in areas with high concentration of dust, and those who have chronic lung inflammation, should undergo physical examination, such as sputum cytology every 4 month or chest X-ray once a year
4. Eat more fruits and vegetables, as well as food that contains vitamin C and E and selenium, such as ground rice and rice bran. Exercise regularly.
5. Do not consume food that has high fat content. Alcoholic beverages may increase the risk of lung cancer.

Lung Cancer



Skin Cancer

Skin cancer is the most common type of cancer. It is the type of cancer that can be completely cured. This is because it can be detected fast and easy to follow up with the treatment. In addition, it develops or grows slowly. There is only one type of skin cancer that is difficult to be treated, which is melanoma. In the early stage, it will resemble moles. However, it will later grow and spread through the blood stream rapidly.

Causes:

1. Sunlight and UV light - it is found that the part of skin that is exposed to sunlight for a long period of time has more risk of developing into cancerous cells than other parts.
2. Medicines that contain arsenic, both Chinese and Thai medicines - if consumed over a long period of time, skin disease may occur, which eventually develops into cancer.
3. Wart, mole, birthmark, and chronic wound that experience prolonged irritation may develop into cancer.

Symptoms:

Mostly, it begins with changes of wart, mole, birthmark, or small wound that gradually grows and becomes rough. It might blacken at the edges and the papules may be cauliflower shaped. Generally found on the face, arms, legs, soles, and torso.

Treatment:

Depends on the type, size, and location of the cancer. Surgical procedures may be used to remove the cancerous part of the skin. Sometimes, it may be necessary to remove the lymph node where cancer is spreaded. The use of chemotherapy and radiation therapy may increase the chance that the cancer is completely cured.

Precaution:

In the event of chronic wound that cannot be cured within 2 weeks or there are changes in the wart, mole, birthmark, or scar that becomes darker or larger or turn into a wound, visit a physician immediately.



Special Safety Manual For Section Surface Treatment

Danger from Working with Chemicals

Route of Entry can be divided into 3 main ways;



1. Inhalation

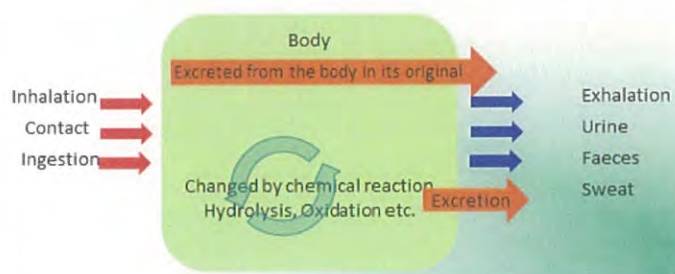


2. Ingestion



3. Dermal absorption

The Process when Chemicals enter the body



Ways to Prevent Chemical Hazards

1. Source Prevention

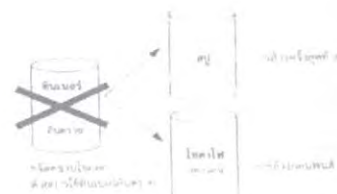
- 1.1 Use other less toxic chemicals
- 1.2 Change the production process
- 1.3 Separate the production process that are dangerous
- 1.4 Cover the production process and the source of Chemical
- 1.5 Install exhaust system at the specified place
- 1.6 Always maintain machine and equipment to be in a good condition, clean and organise

2. Path Prevention

- 2.1 Always clean up the work space to prevent any chemicals accumulation
- 2.2 Install air ventilation
- 2.3 Increase the space between the person and the source of chemical
- 2.4 Always check the chemical level in the working area

3. Personal or Receiver Protection

- 3.1 Educate and train workers about the danger of the chemicals they are working with
- 3.2 Shorten the working hours that involve contacting with dangerous chemicals
- 3.3 Workers should work in shifts and rotate
- 3.4 Workers should be working in a special control room
- 3.5 Workers should be physical examined for chemicals before work
- 3.6 Use personal protection kit
- 3.7 Install water tap, shower, eye wash and other first aid kit



3E Principles for safety

1. Engineering is using technical knowledge in engineering to design the safest working machines and equipment when using them in normal condition
2. Education is educating and training the workers to strengthen their work knowledge and abilities
3. Enforcement is implementing rules and regulations for safety



What effects do chemicals have on body?

When the chemicals get into the body, with the nature of human's body, the body will have a system to dilute the chemicals and try to excrete the chemicals through sweat, breast milk, urine, saliva, breath, etc. In the case of having high level of chemicals in the body, it will result in these damages;

3.1 Respiratory system

Cause irritation in the first part of the respiratory system, deteriorate the lungs tissues, flexibility of the lungs, cause allergy, or cancer if repeatedly in contact for a long time, e.g. lung cancer, nasopharynx cancer, primary irritation, allergic to light, permanent damage to the skin, skin cancer

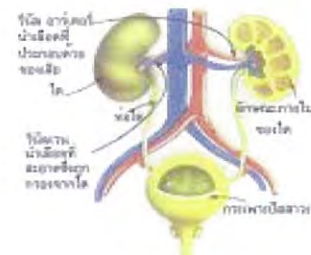
3.2 Eyes

Cause irritation, inflammation, conjunctivitis, blurred vision, teared or blindness if contact with high

3.3 Blood system

Affected cells that produce red blood cells (bone marrow), blood components (platelets, red blood cells, amount of chemicals and white blood cells) or the cells' ability to carry oxygen

3.4 Inner organs, i.e. liver, kidney, blood, spleen and reproductive system



Acid-Alkali or corrosive substances refer to chemicals that can erode metals or cause danger to skin tissues when directly contact or inhaled the chemicals, the severity depends on the intensity of the chemicals.

Acids are divided into 2 categories

- Inorganic acid e.g. Sulfuric acid : H_2SO_4 , Hydrochloric acid : HCl , Nitric acid : HNO_3 , Hydrofluoric acid : HF
- Organic acid, acids that have Carboxylic group (COOH) e.g. Acetic acid, Formic acid, Lactic acid, Lavric acid, Maleic acid, etc.

Acids are divided into 2 types

- Acidic means acid that can emit a lot of protons or split itself into ion successfully
- Light acid will unsuccessfully split itself into ion
- Concentrated acid means acid that have high acid molecule per 1 unit volume of water

Danger of Acid

- Cause skin irritation or inflammation
- Cause eyes irritation or blindness
- Cause nose irritation or rhinitis
- Dangerous to environment, e.g. affect water, land and air



Danger Warning Symbol

Danger of Alkali

- Burn skin
- Dangerous to environment, e.g. water and sea life, land, air

Danger of Carbon Tetrachloride (CCl_4)

- Immediate effect if inhaled in high amount; will be unconscious and may be dangerous to heart
 - Back pain, affect liver, kidney, vision and will be more dangerous if the person consumes alcohol
- Must have good air ventilation to prevent inhaling chemicals into the body

Danger of Hydrolic Acid (HCl)

- Cause irritation to skin, respiratory system and other parts that contact the chemicals. General prevention is using gloves and masks, cream and good ventilation.

Danger of Nitric Acid (HNO_3)

is an acid that has very fast chemical reaction, it oxidises other chemicals and it is highly corrosive. Must be stored in a glass container and away from paper and wood. If very concentrated, it can cause explosion and fire. When the nitric acid reacts with other chemicals, it will produce NO_x (Nitrogen Oxide), which is dangerous to human's respiratory system and all the way to the lungs.

Danger of Sulfuric Acid (H_2SO_4)

Dangerous to humans because it deteriorates issues that are in contact with it e.g. respiratory system, causes blister, dermatitis and conjunctiva irritation. This can be prevent by avoiding the evaporated gas and direct contact by using personal protection kit. High concentration sulfuric acid will erode metals, can absorb moisture from the air, and when reacts with metals, it will produce flammable gas that are explosive.

Danger from working with Zinc Chloride : Zn

Usage :

Used to manufacture battery, used as a catalyst, used to manufacture toothpaste, use to eliminate odors and smoke.

Health Effect :

Inhalation : when inhaled, this chemical will damage the mucous membranes tissues and the top part of the respiratory system, causing muscle spasm, inflammation and swelling of the larynx and trachea, Pneumonia, chest pain, pulmonary flood, cough, burns, sneezing, shortness of breath, headache, skin turns blue, fever, nausea and vomiting

In contact with skin : Chemical absorption through the skin can cause danger, the chemicals will damage the tissues and the tissues lining of the skin causing skin brokage

Ingestion : Ingesting chemicals will damage mouth, throat and digestive system, causing stomachache, nausea, vomiting, blood in faeces, swollen throat, blood in urine and unconsciousness

In contact with eyes : when in contact with eyes, will damage eyes, cause irritation, and burn the cornea

Chronic exposure can lead to abnormal growth of the fetus in the womb.



First Aid

Inhalation : If inhaled, move patient to area with fresh air; if the patient is not breathing, give artificial respiration; if the patient is short of breath, give oxygen aid, then take the patient to the hospital.

Ingestion : If ingested, if the patient is still conscious, let them rinse mouth with water

In contact with skin : If contacted with skin, immediately rinse with lots of water for at least 15 minutes, take clothes and shoes that are contaminated with chemicals off, and take the patient to the hospital. Contaminated clothes must be washed before wear them again and contaminated shoes must be thrown away.

In contact with eyes : If contacted with eyes, immediately rinse with lots of water for at least 15 minutes, using the fingers to open the eyelid while rinsing and immediately take the patient to the hospital

Storage and Handling

- o Store in tightly sealed container
- o Store in cool and dry place
- o Do not inhale the chemicals
- o Do not contact with eyes, skin and clothes
- o Avoid prolong contact
- o Wash yourself thoroughly after moving



Danger Working with Chromium Hexavalent Chromate : Cr^{+6}

Usage :

Used in the laboratory



Health Effect :

Inhalation : Inhaling this chemical will damage the mucous membranes tissues and the top part of the respiratory system, causing blisters, holes at the nasal wall, throat inflammation, coughing, shortness of breath, breathing difficulty, causing symptoms relating to lungs, allergy from asthma, and when contacted with concentrated chemicals, can cause pulmonary flood

In contact with skin : As this chemical is corrosive, when contacted with skin, will cause rashes, pain, severe burn. Concentrated dissolved chemicals will cause severe irritation when contact with broken skin or wound, causing chrome sores and absorption. If absorbed into the body, will be toxic and this will affect the function of the liver and kidney, leading to sensitive skin.

Ingestion : when ingested, will cause burnt at the mouth area, throat and stomach, which can lead to death, coughing, vomiting, diarrhea, intestinal inflammation, blood vessels contraction, dizziness, thirsty, clamps, unconscious, coma, abnormal blood circulation, fever, liver damage and kidney failure

In contact with eyes : as this chemical is corrosive, when contacted with eyes, it causes blurred vision, conjunctivitis, pain, severe burn, and may cause damage to the cornea or blindness.

First Aid

Inhalation : If inhaled, move patient to area with fresh air; if the patient is not breathing, give artificial respiration; if the patient is short of breath, give oxygen aid, then take the patient to the hospital.

Ingestion : If ingested, do not make the patient vomit, let the patient drink lots of water, if the patient passed out, do not put any object in their mouth and should be under the doctor's care immediately

In contact with skin : If contacted with skin, immediately rinse with lots of water for at least 15 minutes, take clothes and shoes that are contaminated with chemicals off, and take the patient to the hospital. Contaminated clothes and shoes must be washed before wear them again.

In contact with eyes : rinse with lots of water for at least 15 minutes and blink repeatedly. While cleaning the eyes, take the patient to the hospital immediately.

Storage and Handling

- Ø Store in a tightly sealed container
- Ø Prevent physical damage
- Ø Store in cool, dry and good air ventilation place
- Ø Store away from sources of heat, sparks, humidity, and incompatible chemicals
- Ø Wear protective equipment when doing maintenance work, as it requires being in contact with high level of chemicals



- Ø Wash hands, face, arms, and neck when leaving the control room, shower, change clothes and wash clothes after work everyday
- Ø Avoid clothes that are contaminated with chemicals and wash your hands before eating
- Ø Do not eat, drink, smoke in working area
- Ø Chemicals containers that are now empty but contaminated are dangerous
- Ø Watch for signs and read the signs carefully before working on any task

Personal protective kit



Chemical protective
gloves



Goggles



Chemical protection
suit



Chemical protective masks



Masks

Special Safety Manual For Office

Danger of Office Work

Danger from photocopier machine

Although there is no threat when working in offices, health and sanitation is as serious as working in factories and industries. There is always a question about photocopier machines that are commonly used in offices, whether they can cause danger to users' health and safety or not. Especially, when there are bright light and smell when the machine is in use. As well as, the diffusion of the toner, which is stained to the area around the machine. How are these dangerous?



1. **Ozone** will be emitted in the photocopying process. The ozone will generally cause irritation, but prolonged exposure to this gas can cause danger to the respiratory system and the nervous system.
2. **Toner** are composed of dangerous chemicals, including carcinogenic and the substances that cause allergy.
3. **UV Light** often harms the eyes. Being exposed to bright light from the photocopier machine for a long period of time can cause eye pain and headache.



When refilling toner or carrying out maintenance, if do not carry out with caution, can be harmful to health.



Photocopying with out closing the cover will cause eyes irritation and headache to the users and people near by.

Instructions for safe photocopying



⚠ Close the cover completely when photocopying. In the case where the cover cannot be closed completely, avoid looking at the copier.



⚠ Should install air ventilation in the photocopy room



Æ Should wear gloves when refilling or removing the toner and where appropriate, wear safety mask. As well as that, ask for safety documents about chemicals usage from the photocopy manufacturer or the vendor.



Æ This includes toner spilling when refilling the toner.



Æ When buying a photocopy machine, must check to ensure that there is a safe toner refilling process and a container for toner remains in the machine - the machine will stop working automatically when the container is full. Also, make sure that the machine is being regularly check for maintenance.



Æ Make sure that the machine is being regularly maintained.

Æ Do not place the machine in the working room, should be place separately in the photocopy room or in the corner that is far from working areas and make sure that there is good air ventilation in that room.



Æ Service staffs and maintenance staffs should wear disposable gloves and avoid direct contact with the rollers.



Æ Noone should be working with the photocopy machine the whole day, especially people who have respiratory system problem.

Æ Workers who will be working with the machine should be well-trained.

Æ Users should be trained about how to use the machine and its safety.

Æ Workers who are responsible for the equipment should be trained about how to move and keep the chemicals that results from copying process, as well as how to use those chemicals and dispose waste.

Danger from working with computers

Danger to eyesight

Happens to workers who work with the screen with too much light, with reflective light, monitors that are too colorful, big difference between the light in the room and the screen, or the image in the screen is not still. This will cause tiring eyes and irritation.

Danger from working repetitively in the incorrect posture

Back, shoulder, arm, leg, neck muscle pain happens as a result from working in the incorrect posture. This may be due to arrangement of desks, screen level, and chairs that are not suitable for the workers' body size or workers have to work in the same posture throughout the day.

Finger ligament inflammation happens from typing on the keyboard for a long time, causing pain, numb, and area around the finger joints do not have the strenght to hold or carry things.

Stress happens from doing the same tasks for a long time, causing the worker to be moody and have headache

Body muscles weakness and bent spine happens from working in the same posture, did not change the posture, causing the body muscles to be weak. As well as causing problems with the digestive system and the respiratory system.

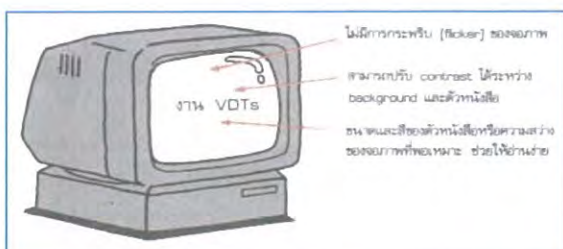
Varicose veins often happens to pregnant women, because sitting for a long time makes the blood cloth in the calf.



Ways to Prevent

Eyes protection

- Ø Choose or adjust the computer screen to give good resolution, the height of the letter should not be lesser than 3 millimeters. Letters that are similar should have a clear difference, the image on the screen should not flutter, and avoid big difference between the lighting of the letter and the screen because this will increase eyes strain.
- Ø Adjust the light in the room to prevent bright light and reflective light, should use curtains. Make sure that the light from the light bulb do not go into the workers' eyes and make sure that there is no strong brightness contrast in the room.
- Ø Adjust the distance between the eyes and the work e.g. computer screen, documents, do not place it too far away because it will strain the eyes.



Preventing danger from working repetitively in the incorrect posture

Design workplace that is suitable to the workers' body size e.g.;



ñ **Keyboard** should be separated from the screen and should be at elbow height, if too high will cause shoulder and neck pain. If too low, the workers will have to bend down, causing back pain.

ñ **Chairs** that are adjustable, backrest should be at the suitable height and angle.

ñ **While working** legs should be comfortably place under the table

ñ **Computers with multiple users** Should have foot rest, so each worker can adjust the height to suit them

ñ **Organize the work** should have work rotation



ñ **Set short breaks during work**

ñ **Give advice and training** on physical exercises that can be done in the workplace to relax, relieve muscle strain and eyes strain



ñ **Correct working posture** is sitting on the chair and laying on the backrest completely. There should be a space between the bottom of the thigh and the chair, to reduce pressure and increase blood circulation. Furthermore, stretching the arms and legs or changing the posture will reduce muscles stain. The picture of the correct working procedure can be seen below.

Health problems in the

You try to look at yourself a little bit. See whether you belong to any of these health risk factors for office workers or not.



You are someone who works in the same posture for more than 6 hours per day

You are someone who works with numbers for more than 6 hours per day

You are someone who have to sit and write documents for more than 6 hours per day

You are someone who uses computer for more than 6 hours per day

If one of these 4 factors is your daily routine, you are in one of the risk factors that is

being affected by these symptoms.



8 out of 10 people have neck pain

7 out of 10 have shoulder pain

Pain around neck muscle and shoulder

Happens from many reasons, including the posture during work, the nature and the environment of the workstation, as well as stress from work or working repeatedly for a long period of time.

These are important issues that must not be overlook because these symptoms can lead to severe health problem, being to the disease of the decade, commonly known as "Office Syndrome" or health conditions arise from the workplace.

Ways to prevent and treat neck and shoulder muscles

It can be done in a variety of ways, depending on the causes. For instance, adjusting the work station to suit yourself, change your working posture or move your body every 15-20 minutes, relief stress, strengthen and make the bone and muscles more flexible, massages, using hot-cold temperature to make mucle contract, do easy exercise with different moves, or for people who do not have time and need convenience, use muscular pain relief products that are developed for neck and muscle pain, etc.

Exercise moves to help relax when sitting or using computer for a long time

ท่าที่ 1 :

ครั้งละ 10 - 20 วินาที
(2 ครั้ง)



Move 1:
10 - 20 secs
per set (2 sets)

ท่าที่ 2 :

ครั้งละ 10 - 15 วินาที



Move 2:
10 - 15 secs
per set)

ท่าที่ 3 :

ทำซ้ายและขวา
ครั้งละ 8 - 10 วินาที



Move 3:
Both left and
right 8 - 10
secs per set

ท่าที่ 4 :

ครั้งละ 5 - 20 วินาที



Move 4:
5 - 20 secs per
set

ท่าที่ 5 :

ครั้งละ 3 - 5 วินาที (3 ครั้ง)



Move 5:
3 - 5 secs per
set (3 sets)

ท่าที่ 6 :

มือและแขนซ้าย - ขวา
ข้างละ 10 - 12 วินาที



Move 6:
Hand and left -
right arm 8 - 10
secs per set 10 - 12
secs per side

ท่าที่ 7 :

ครั้งละ 10 วินาที
สลับกันไป



Move 7:
10 secs per set
Switch sides

ท่าที่ 8 :

นั่งลงและยกแขนขวาขึ้น
และแขนซ้ายเหยียดลง
ครั้งละ 8 - 10 วินาที
สลับข้างกันไป



Move 8:
Sit down, hold
your right arm
up and stretch
your left arm
downwards 8 -
10 secs per set
Switch sides

ท่าที่ 9 :

หันขวา - ซ้าย
ครั้งละ 8 - 10 วินาที
สลับข้างกันไป



Move 9:
Turn arm - left
leg 8 - 10 secs
per set Switch
side

ท่าที่ 10 :

นั่งหลังตรงและใช้มือจับที่เอว
ครั้งละ 8 - 10 วินาที
(2 ครั้ง)



Move 10:
Sit with your
back straight,
hands on your
waiste 8 - 10
secs per set (2
sets)

ท่าที่ 11 :

สะบัดข้อมือ 8 - 10 วินาที



Move 11:
Shake your
wrist 8 - 10



Prevention of Workplace Injuries

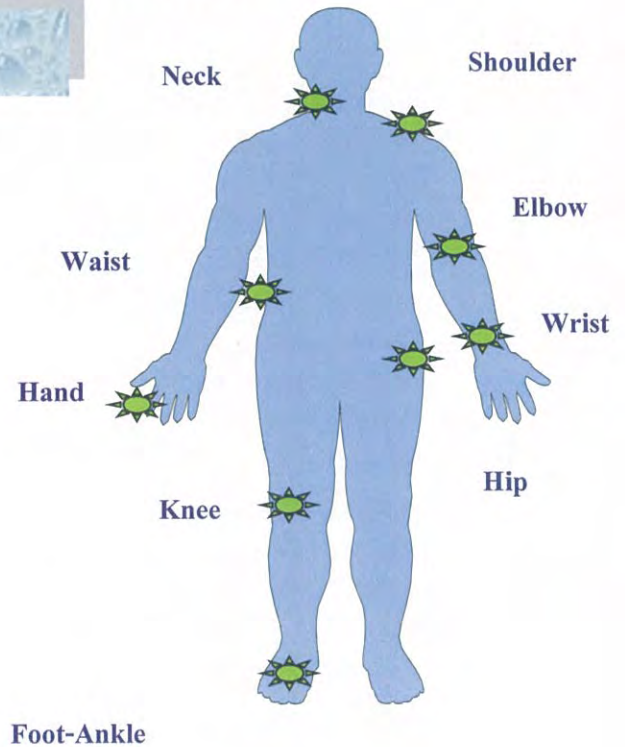
Time & Motion Risk

Risks From Incorrect Posture

1. Risk to ligaments and muscles
2. Risk to various joints
3. Risk to the nerves
4. Risk to blood vessels

Related Risk Factors

1. Posture
2. Work Frequency
3. Force / Exertion
4. Weight / Load
5. Duration
6. Tool / Machine
7. Environment



Based on the posture of employees, it is found that there are risk factors that may cause injuries from work due to the fact that the posture characteristics include stooping down, twisting waist, reaching out, standing, or sitting for a long period of time. Hence, these poor postures may cause injury, illness, back pain, or muscle pain, as illustrated in the pictures below:

HEAT TREATMENT



HEADER

ROLLING

MACHINING

QC/KZ

F/G




Back Pain at Work



is a disease with a pathophysiology that is associated with back muscles, ligaments, intervertebral disc, and facet joints. It is a major problem that is very common amongst factory workers and other labor workers in general. One of the most common symptoms is lower back pain, which is the main cause of sick leave. Not only does back pain result in dull aching sensation and stiffness, it also reduces the ability to move, diminishes the ability to flex the back, and therefore decreases the range of motion. Resting may help to relieve the symptoms, but only temporarily. Chronic back pain may result in sick leave, loss of income, increased medical expenses, and eventually disability.

Causes of Back Pain



1. Incorrect Motion or Posture, Lack of Exercise, or Overweight

In particular, those who sit with a "hunchback" posture for a long period of time or frequently stoop down at work, or sleep on a mattress that is too soft, or sleep on a canvas chair that causes curvature of the spine for a long period of time. Meanwhile, for overweight individuals, the spine has to assimilate the burden of excess weight, causing stress to the facet joints.

2. Back Sprain or Strain

This occurs when the back muscles or ligaments are stretched or torn, generally during movement or in the presence of incorrect posture, such as when bending down to lift a heavy object. It may also occur from sports activities or road accidents. This type of back pain can be completely cured if treated immediately.

3. Herniated Intervertebral Disc

This is often found in patients who lift heavy objects incorrectly. The pressure on intervertebral disc will cause the disc to bulge or herniate, which may further lead to pain in the back leg, as known as "sciatica". Generally, the pain will also spread to either side of the hip with mild curvature of spinal around the waist, impeding the ability of the back to flex and resulting in severe pain. The prolonged nerve compression may lead to nerve damage, numbness, and weakness of ankles or toes, which require a surgical procedure.

4. Degeneration of Spine

It is natural for the body to degenerate with age, so do the spine and intervertebral disc. Over the course of time, bone spur will develop that results in the friction between the spine and nerves, causing intermittent back pain. Sleeping or resting may help to relieve the pain, but not permanently. When the back is heavily used, back pain may reoccur. The occurrence of such degeneration will depend on the proper usage of the back. Some patients are diagnosed with severe spine degeneration with sequestration, and will have similar symptoms as in clause 3.

5. Lumbar Fascia

This can be found in people of all age groups with a history of mild back pain that is caused by ruptured ligaments or people who had long experienced symptoms similar to that of herniated intervertebral disc; whereby the symptoms suddenly reoccur. These individuals may experience a tingling sensation around the spine, limited ability to flex the back, stiffness around the waist, and reduced mobility in daily life. When sitting or standing for a long period of time, the pain will become more severe. Some may even experience myoneuralgia with numbness at the back of the legs. These symptoms are caused by lumbar fascia or constricted nerves, which consequently diminish the mobility of spine around the waist and result in higher risk of back pain. It is indeed considered as the most common cause of back pain.

6. Pain Associated with Muscle Tissues

Pain spots at the muscles around the lower back or either side of the hip or both sides of the hip, or around the calf muscles, or shin muscles, without definite causes. The symptoms also include back pain that spreads to the back of the thigh, calf, shin, or foot, without any abnormality of the spine. The pain will become more severe when walking long distances.

7. Stress

In our daily life, it is normal to have family or social issues that result in frequent emotional changes. In particular, women who are in the pre-menopause stage that naturally causes changes in the hormones. These emotional or hormonal changes further affect the back muscles, resulting in muscle contraction and back pain. Therefore, the best treatment would be "meditation" or improvement of mental and physical conditions to adapt to the environment.

8. Other Causes

These are minor causes of back pain. For instance, organ-related diseases such as kidney disease, pelvic inflammatory disease, benign prostatic hyperplasia, scoliosis, or congenital spinal abnormalities.

9. Hypotonicity of Muscles and Tissues

In this case, hypotonicity refers to muscles and tissues around the abdominal areas, since these areas are not connected to the spine. This group of muscles and tissues is also one of the heaviest areas of the body. After ingestion, the weight of the abdomen will increase, causing burden to the spine and subsequently resulting in back pain. Accordingly, it is important to work out regularly to increase muscle strengths, as well as exercise to hold the spine. These may help to relieve back pain without having to consult a physician.



Prevention of Back Pain

1. Check the strength of muscles, particularly at the arms, legs, back, and abdomen, in order to select/assign duties that are appropriate with the worker's capability
2. Maintain good and appropriate back posture such as
 - ensuring that the postures of sitting, walking, standing, sleeping, or working are in a straight back position, without twisting or bending the waist
 - changing postures regularly while working or finding a backrest to support the back, particularly for work that requires sitting or standing most of the time
3. Work out or exercise regularly to increase the strength and flexibility of the body
4. Reduce stress and improve mental health
5. Stop smoking because it will speed up the process of degeneration.

Treatment of Back Pain

1. **Conservative management** such as rest, take pain killers, anti-inflammatory drugs, or muscle relaxants, use warm compresses, and physical therapy. Once the symptoms are alleviated, patients may exercise the back muscles afterwards. Some cases may require anesthetic or steroid injection at the pain spots or the vertebral columns. However, it is not recommended by physicians.

2. **Surgical procedures for necessary cases**



Correct Postures of body movement

Standing

1. Stand with back straight, keep the head align with the shoulder line, and contract the abdomen
2. If required to be standing for a long period of time, one leg should be rested on a leg rest to keep the spine straight and prevent leg pain
3. Bend one knee forward, instead of stooping down, and keep the back straight when performing activities such as brushing teeth
4. Walk with the back and head straight, step the foot forward, swing arms gently, and wear comfortable shoes that are made of rubber or any other materials that prevent slipping



Lifting an Object

1. Squat down with one knee supporting on the floor, keep the back straight at all times
2. Lift the object and keep it close to the body
3. Straighten both legs to lift, keeping the back straight
4. Do not stoop down, keep both knees straight while lifting



Sitting

1. Sit on a chair with appropriate height that allows both feet to be completely rested on the floor
2. Buttocks should touch the back of the chair
3. The back should be straight and lean against the backrest

Important Components of the Chair

1. Appropriate height, allowing both feet to be rested on the floor
2. The seat should support the buttocks all the way to the knees
3. The backrest should be at a 110° angle with the seat and the top of the backrest should be at a shoulder level

Sitting at Work

1. When reading or writing in a sitting position, the back should be completely leaned against the backrest
2. Do not bend over too much. The working table must not be too far.



Sitting in Front of Computer

1. The keyboard should be at the same level as the waist or a little above the lap
2. The computer screen should be at the same level as the face, similar to the music note stand, and must be at the same height as the eye level



Driving

1. Adjust the seat to be close to the steering wheel. The seat should be close enough to allow the feet to reach the pedals. Knees should be higher than the hip
2. Should use a back support if the seat is too low. The backrest should not recline more than 100° angle
3. If the seat is too soft, a seat bottom cushion should be used



Sleeping

1. The mattress should be hard enough and must be able to support the curvature of the spine. When lying down, the mattress should not sag
2. When lying faced up, there should be a leg pillow to ensure that the buttocks lie flat against the mattress
3. When sleeping sideways, bend the knee a little and embrace the side pillow, keeping the back straight



Getting Up From and Lying Down on Bed

1. If lying faced up, bend both knees upwards
2. Tilt sideways while keeping the knees in the same position
3. Use the elbow and hand to lift the body, while suspending both feet to the ground
4. Push the body up to sit in a straight position, rest both feet on the ground
5. When lying down, repeat the process but going upwards from the bottom to the top



Treatments of Chronic Myofascial Pain Syndrome (MPS)

MPS can be treated with "Trigger Point Therapy" that needs to be treated only once per week. With only 4-6 times of treatment, the symptoms of chronic pain can be alleviated.



Concept of Trigger Point Therapy is:

1. Reduce pain that is caused by muscle contraction
2. Treat the cause of chronic pain by loosening trigger points
3. Prevent the reoccurrence of trigger points by providing knowledge on correct usage and maintenance of the muscles

Trigger Point Therapy can be separated into 3 steps of treatment:

1. Inquire about the history of pain and find trigger points that are embedded in the muscles and fascial tissues
2. Relax the contracted muscles above the trigger points to relieve pain
3. Once the contraction reduces, the physician will press onto the trigger point around the pain area, causing it to be loosened to enable circulation of blood and oxygen to the trigger point, reducing inflammation.

After 4-6 times of treatment, the trigger point will loosen and become normal muscles, which cannot be diagnosed with bare hands. Hence, the cycle of chronic pain will be ended. However, to ensure that it does not reoccur, the patient must take care of and exercise the muscles regularly, avoiding all risk factors, and should visit a physician once a year to prevent chronic pain.

Exercise Poses to Prevent Back Pain

Exercise to Increase Strength and Endurance of Abdominal and Back Muscles

Pose 1



1. Lie faced up, bend knees, press the back against the mattress with both hands behind the head.
2. Contract the abdomen by lifting both head and shoulders upwards, while fully contracting the buttocks and lifting them up slightly above the floor, keeping the back pressed against the mattress. Hold for 5 seconds and return to the resting position. Repeat 10-15 times.

Pose 2



1. For the resting position, bend both knees, press the head and shoulders against the floor with both hands beside the body.
2. Lift the torso, hip, and thigh above the floor. Hold for 5 seconds and return to the resting position. Rest and repeat for 10-15 times.

Pose 3



1. Lie with face downwards. Use a pillow to support the chest and abdomen.
2. Bend the back and shoulders, inhale while slowly lifting the body up. Exhale while lowering the body. Repeat 10-15 times.

Exercise to Increase the Flexibility of Back and Leg Muscles

Pose 1



1. Sit on a bed with one leg straightens out, while the other leg is placed on a leg rest.
2. Straighten both arms and place them on the straightened leg. Take a deep inhale and slowly lean the body forward, reaching both arms out as far as possible. Exhale slowly and return to the resting position. Repeat 10-15 times.

Pose 2



1. Sit on a bed with one leg straightens out and the other leg is bent.
2. Straighten both hands and place them on the straightened leg. Inhale and slowly lean the body forward, reaching both arms out as far as possible. Exhale slowly and return to the resting position. Repeat 10-15 times.

Pose 3



1. Lie faced up, bend both knees and press the back against the mattress. Place both hands underneath one of the knees.
2. Slowly inhale and pull the knee towards the chest. Slowly exhale and repeat on the other leg.
3. Place both hands underneath both knees. Slowly inhale and pull both knees towards the chest. Exhale slowly and return to the resting position. Repeat 10-15 times.

Pose 4



1. Lie faced up, with one leg straightens out and the other leg at an angle. Place both arms beside the body and press the back against the mattress.
 2. Slowly inhale, lift the straightened leg up and count 1-10. Exhale slowly while lowering the leg.
- Alternate the leg and repeat 10-15 times.

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- Safety in Working with Machinery
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- Safety in Working with Electricity
- Safety in Working with Crane
- Safety in Working with Hazardous Chemicals
- Safety in Working with Boilers
- Safety in Working at Height or at Risks of Falling Objects and Damaged Objects
- Fire Prevention and Suppression at a Workplace for Employees' Safety
- Safety in Working at a Construction Site

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- Prescribing the Type of Diseases that Occurs According to the Nature or Condition of Work or Due to Work
- The Committee of Occupational Safety, Health, and Environment of a Workplace

Ministerial Regulations under Labor Protection Act B.E. 2541

- Prescribing the Standard for Administration and Management of Occupational Safety, Health, and Environment For Confined Space Workplace B.E. 2547
- Ministerial Regulation Prescribing the Allowable Rate for Employee to Caree
- Ministerial Regulation Prescribing the Criteria and Procedure for Medical Examination of Employees and Submission of Examination Result to Labor Official B.E.2547
- Prescribing the Standard for Administration and Management of Occupational Safety, Health, and Environment for Works Involving Heat, Light, and Sound B.E. 2549
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REFERENCES

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- Criteria and Method of Training for Safety Officers in Workplace
- Criteria and Method for the Election of Employee Representative Committee
- Criteria and Method for Submission of Safety Officers' Names at a Workplace for Registration and Notification of Employees in Case of Accidents, Injuries, or Loss
- Criteria and Method for operate report of Safety Officers
- Criteria and Method of Training for the Committee of Occupational Safety, Health, and Environment of a Workplace B.E. 2549
- Criteria and Method for Measurement and Assessment of Works Involving Heat, Light, or Sound at a Workplace, including the Period and Type of Business Required for the Assessment
- Prescribing the Form for the Medical Examination Book of Employees Working with Risk Factors and Form for Abnormal Examination Results or Treatment of Injury or Illness and Prevention B.E. 2551
- Prescribing Criteria and Method for Training the Head of Workplace Safety Unit B.E. 2551
- Precribing the Forms for Submission of Details, Safety Report, Risk Assessment, Measurement Results of the Concentration of Hazardous Chemicals

Regulations of the Department of Labor Protection and Welfare

- Training Course for Safety Officers at a Workplace B.E. 2549

The Occupational Safety, Health and Environment Act B.E. 2554



FIRE EQUIPMENT SIGNS



SAFETY CONDITION SIGN



MANDATORY SIGNS



WARNING SIGNS



PROHIBITION SIGNS