英語版

For Technical Intern Trainees
技能実習生向け

One Step for Technical Intern Trainees to Conduct Welding Operations Safely

技能実習生が溶接作業を安全に行うための第一歩

JITCO

Contents

Introduction

Welding is a skill used in products and structures in a wide range of fields, including shipbuilding, automobiles, industrial machinery, and construction.

Related and peripheral work therefore encompasses a lot, and it can be difficult to know how much information to include in technical training.

We ask technical intern trainees to read this safety and health operation manual carefully to learn the techniques for staying safe and comfortable on the job. This includes learning the proper way to wear protective equipment and understanding where the dangers lie and what to be careful of in order to protect oneself as a trainee in welding operations.

We hope that mastering the information in this manual will allow you to make excellent progress in your technical training by serving as a useful safety guide.

1 Three Common Types of Accidents in Welding Operations

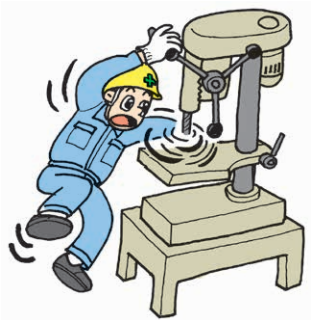
The three most common types of accidents in the welding operations that you are involved in account for around 70 percent of all welding-related accidents.
(Based on an occupational accident survey conducted by JITCO in fiscal 2015.)

Eye damage from sparks and grinder shavings: 35%

Welding sparks and grinder shavings flying up and hitting the eyes and face cause many injuries. Also, viewing welding arc light can be harmful to the eyes and cause them to hurt.

Pinching and entanglement: 23%

Gloves often get entangled in electric drills when workers put a hand in to remove trash or material caught in a machine without turning the machine off. This sometimes leads to serious injuries such as severed hands or fingers, broken arms, or other injuries that leave workers physically impaired.



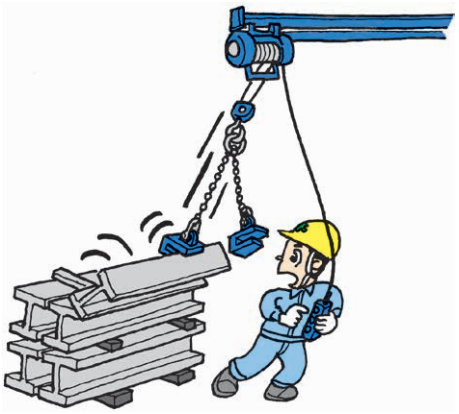
Cuts and abrasions: 14%

Workers often cut their hands or legs with grinders and cut their fingers on materials such as steel plate.

2 Operations with the Highest Incidence of Fatal Accidents

(1) Handling heavy loads

Getting pinned between or under heavy loads can cause serious injury. Never operate a crane, perform rigging, or do other such work without a license.
When a licensed operator steps away, an assistant should never do anything until the licensed operator returns. Wait in a safe location.



(2) Handling processing machinery other than welding machines

The scope of work that you can engage in as a welder is defined. Just because someone might ask you to do something does not mean that you can engage in any type of work.
You may not engage in work other than welding until after you have received adequate safety and health training.

3 Accidents That Can Happen during Welding Operations and Questions

Checklist (Safety Glasses)

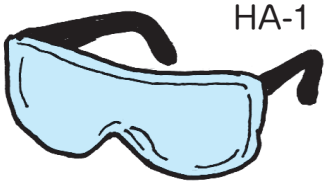
	Item to Check	Yes	No
1	Do you know what kinds of safety glasses there are?		
2	Have you chosen a pair of safety glasses suited to the work you do?		
3	Are you using light-shielding protective eyewear?		
4	Do you know the light-shielding number of the light-shielding protective eyewear you are using?		
5	Do the safety glasses fit your face?		
6	Are you using safety glasses that have side protection?		
7	Do you know why safety glasses that have side protection are good?		
8	Do the lenses of the safety glasses have a JIS mark?		
9	Do you wear corrective prescription glasses?		
10	Do you inspect the eyewear before use?		
11	Do workers have their own safety glasses?		
12	Are you taking care of the eyewear after use?		
13	Are you storing the safety glasses properly?		
14	Do you know when safety glasses should be replaced?		

How much do you know?
Check your knowledge!
See the following pages for the answers.

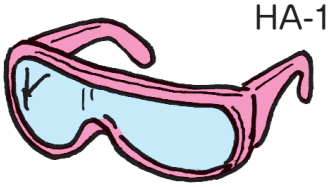
Q1 Why does iron powder get in my eyes even though I wear safety glasses?

A1 Even though you wear safety glasses, debris can still get in your eyes through gaps in the glasses if they do not fit your face, when blown in by a worker next to you, or, in the case of goggles, when debris collected on the top of the goggles falls into your eyes when you take them off.

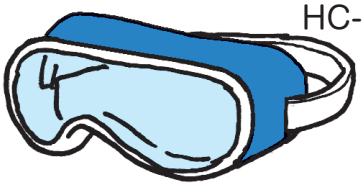
◆ Use safety glasses suited to the type of work (cutting, shaving, grinding, etc.).



Spectacles (protect the eyes from flying objects)



Spectacles with side protection (protect the eyes from flying objects)



Goggles (protect the eyes from flying particles, air-borne dust, and liquid spray, etc.)

Fitting safety glasses

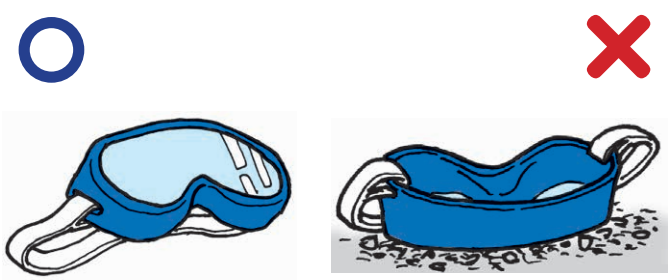
- Choose safety glasses that fit your face. Safety glasses are for personal use. Do not share them with others.
- It is important to adjust the nose pads and temples so that the safety glasses sit securely on your face.
- The glasses should be supported evenly at three points (your nose and both ears).

Fitting points

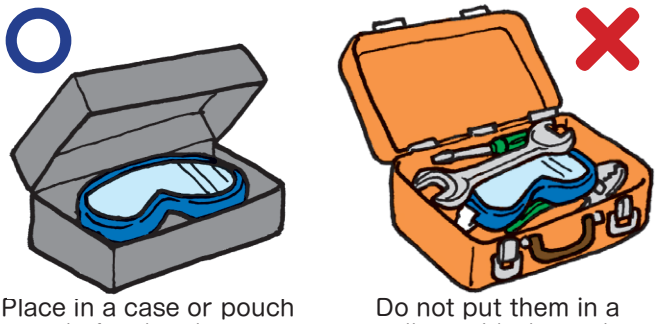
Inspection after use

- Check to make sure there is nothing wrong, such as being dirty, scratched, broken, or that the lenses, eyepiece, or frame are not deformed.
- After use, remove any dust or dirt by rinsing the glasses in running water. Then store them in a soft pouch or case.

How to clean



How to put down safety glasses



Place in a case or pouch made for the glasses.

Do not put them in a toolbox with the tools.

Storage

Q2 People often get hurt doing grinding work. What should I be careful of?

A 2 A grinding wheel is easily damaged or broken by the application of force, so it must be used correctly. You must also be careful of accidents caused by flying shavings, accidents caused by touching or getting entangled in the wheel, and accidents caused by inhaling dust. When performing grinding work, follow the proper procedures and wear appropriate protective equipment.

Example of how to properly use a disc grinder

1. Work

   Grinding soft steel sheet with a disc grinder (Fig. 1)

2. Materials and tools
   - Soft steel sheet (19mm × 80mm × 150mm)
   - Vise
   - Disc grinder, grinding wheel

3. Procedure

(1) Prepare

Set the work piece so that about 10 mm sticks up above the jaws of the vise (Fig. 2).

(2) Grind

a. Hold the grinder in both hands and turn it on. Run it for at least three minutes, checking for abnormalities.

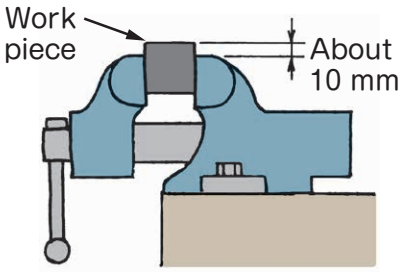
b. Holding the grinder at an angle of 15–30 degrees to the grinding surface, gently push it back and forth to grind (Fig. 3).

(3) Clean

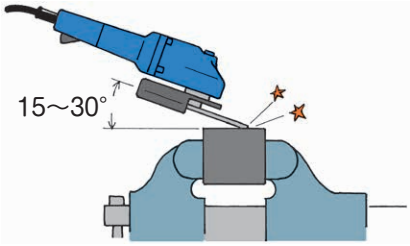
a. Turn the grinder off. When the wheel has stopped turning completely, place the grinder down next to the vise with the wheel facing up. Unplug the grinder from the electrical outlet.

b. Clean the grinding surface with a whisk broom. Clean the grinder debris with a rag.

(Fig. 1)



(Fig. 2)



(Fig. 3)

◆ Precautions ◆

(1) Always wear safety glasses or a safety mask and dust mask when grinding.
(2) Never use a grinder with the safety cover removed.
(3) Never use a grinder with wet hands. Never wet the grinding wheel with water or oil.
(4) Use electrical outlets that have a ground-fault interrupter.
(5) Pushing too strongly on a grinder is dangerous, as it can cause the rotation to stop or break the grinding wheel.
(6) When a grinding wheel is new, the corner can cut into the grinding surface when pushed forward. So, grind by pulling backwards.
(7) Make sure to connect the ground wire. (Some grinders do not need to be grounded.)
(8) Special training is needed to change the grinding wheel.

Checklist (Dust Mask)

	Item to Check	Yes	No
1	Can you explain the types of dust created during the work you are engaged in?		
2	Besides dust, is there any oil mist?		
3	Are there any places nearby where organic solvents are used?		
4	Do you know the type and capabilities of the dust mask you are using?		
5	Do you use disposable dust masks when doing work involving highly hazardous dust?		
6	Have you ever done a mask fit test?		
7	Have you ever used a fit checker?		
8	If you lightly cover the dust mask's air inlets with the palms of your hands, can you still breathe easily?		
9	Do you know when to change the filter in a replaceable dust mask?		
10	Do you put the dust mask's strap around your ears?		
11	Have you ever used a powered air-purifying respirator?		
12	Does your workplace have a person responsible for managing the wearing of protective equipment?		

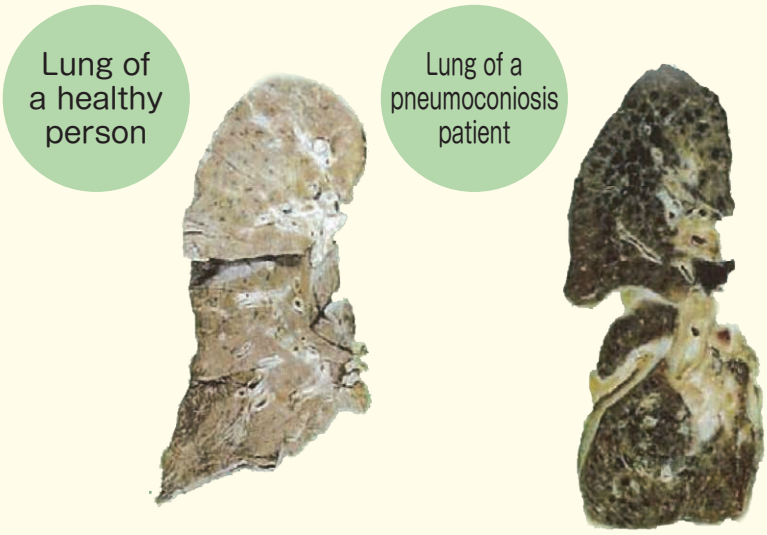
Do you know the answers this time?
Check these questions too!

Q3 Why must I wear a dust mask that makes it hard to breathe, even though I seem to have no bad symptoms?

A3 The smoke from arc welding contains fine dust particles called fumes. When breathed in, this dust goes deep into the lungs, where it is deposited and never expelled from the body.

Dust breathed in today is not going to make you sick tomorrow. However, continued inhalation could result in shortness of breath, a cough, and phlegm.

Further progression could result in a scary disease called pneumoconiosis in which breathing becomes difficult just by walking, you get heart palpitations, and you can no longer work.



(Photographs comparing the lungs of a healthy person and a person with pneumoconiosis)

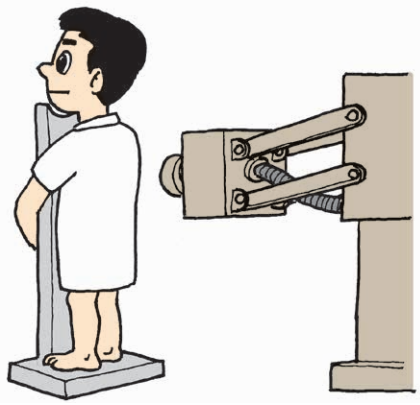
It is important to observe the following points when performing arc welding and grinding to avoid pneumoconiosis.

a. When you first become engaged in this work, get a medical exam for pneumoconiosis and then have regular pneumoconiosis exams thereafter to ensure nothing is wrong.
b. Only start working after putting on a dusk mask that is suitable for the type of work.
c. Run local ventilation equipment.

What is a pneumoconiosis exam?

A pneumoconiosis exam is a test to check for a shadow in the lungs caused by pneumoconiosis. It is performed by film radiography (direct radiography) using an X-ray machine. Before starting dusty work, you must have the test done to make sure nothing is wrong.

Fluorography (a technique in which X-ray photographs are not directly taken) is used during new employee health exams and regular health checkups, but it cannot detect pneumoconiosis. Make sure you have direct radiography tests.

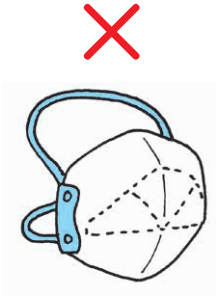


Proper way to wear a mask

Even if you go to the trouble of putting on a dust mask, dust can get in through any gaps.

Gently cover the mask's air inlets with the palms of your hands to make sure that air is blocked from going through the filter, making it difficult to breathe. If this does not make it difficult to breathe, there is a leak between your face and the mask. Move the mask up or down, or adjust how tight the strap is to fit the mask properly.

Replaceable dust mask



Disposable dust mask

Choose a replaceable dust mask when working with highly hazardous dust.

Types of dust masks

There are two types of dust masks (shown at left). Use a mask that has been approved under national testing standards.

Choose a replaceable dust mask if you conduct arc welding and grinding frequently.

When to change the filters

The filters must be changed after a certain period of time, as they become clogged with use, making it difficult to breathe and reducing their performance.

The color of a filter is used to decide when it should be changed.

New filter

Still usable filter

Filter that needs to be changed

* These photos are only examples. The color of filters that need to be changed differs from worksite to worksite.
Check with the protective equipment manufacturer about the color of filters that need to be changed at your worksite.

Q4 Synthetic clothes are warm and rubber boots are convenient even when footing is poor. Why can't I wear them?

A4 Spatter and pieces of slag sometimes fly in all directions during welding. Wear flame-resistant work clothes and leg covers to protect your body from getting burned.

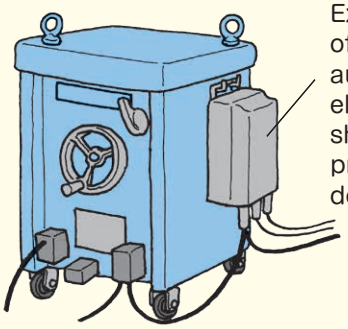
◆ Clothing and protective equipment for welding

- Work clothes: Flame-resistant work clothes are preferable. Do not wear torn or wet clothes.
- Apron: Leather is preferable.
- Hard hat: For protection from flying objects and falls
- Safety glasses: Light-shielding spectacles or goggles
- Dust mask: Replaceable or disposable
- Safety boots: With a rubber sole
- Leg cover: Leather is preferable.
- Gloves: Dry leather. Do not use torn or wet gloves.

Think about what other protective equipment besides the above is needed to protect your body from accidents.

Q5 I am told to use an automatic electric shock prevention device when doing arc welding with an AC arc welder. What kind of device is that?

A5 The voltage in the electrode holder is around 30 V when producing an arc with an AC arc welder. When an arc is not made, the voltage increases rapidly, reaching around 70–80 V. So, were you to touch a connective part of the electrode holder, you would receive an electric shock. An automatic electric shock prevention device automatically reduces the voltage so much that there is no danger of electric shock during these times of no load. Some automatic electric shock prevention devices are internal and others are external.



(Nowadays most have an internal automatic electric shock prevention device)

Danger of Electric Shock

The higher the current running through the body, the bigger the danger. Fifty mA (milliamperes) can be fatal.

Electric shock due to burnout of electrode holder

Electric shock due to burnout of the flexible cable

Electric shock due to exposure of secondary side wiring of an arc welding machine

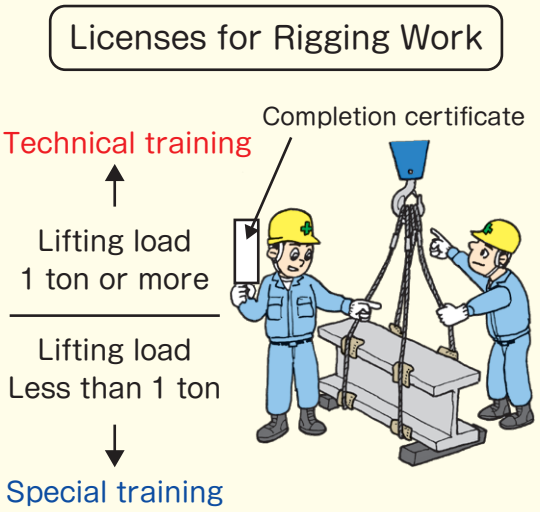
The bigger the resistance, the harder it is for electric current to flow, and the smaller the resistance, the easier it flows. Consequentially, when you are sweating or wet from rain, your skin resistance drops considerably, so if you receive an electric shock, more current would flow through your body, which is dangerous. That is why you must be especially careful in summertime.

An electric shock received by the electrode touching the side of the body while building a steel ramp

Q6 I used to use a crane to lift materials in my country by myself, but I am not allowed to use cranes in Japan. Why?

A6 A crane is a powerful machine that can lift and move heavy loads. This makes it dangerous. If it is operated incorrectly, it can cause a big accident. The legal system in Japan only allows people who have received technical training and special training and who are licensed based on crane capacity to operate cranes.

Also, rigging, such as wire ropes, fiber slings, and clamps and hooks are used to lift loads with a crane. Unless lifted correctly for the type of rigging, the load could swing or drop. It is very dangerous. Rigging refers to both the equipment and the method of attaching that equipment to lift loads. Rigging is another type of work that requires a license in Japan.



List of technical training and special training for cranes, mobile cranes, and rigging

Type	Lifting load	License, etc.
Crane	Floor-operated, 5 tons or more	Technical training in operation of floor-operated cranes
	Less than 5 tons	Special training
Mobile crane	1 ton or more, less than 5 tons	Small mobile crane technical training
	Less than 1 ton	Special training
Rigging	1 ton or more	Technical training for rigging
	Less than 1 ton	Special training

Be careful

- When working as an assistant during crane operations, never go underneath a lifted load.
- Check the crane signals before starting work.
- When working near a crane, never stand within the crane's swing radius.
- Among the different kinds of rigging, clamps, in particular, have a lot of protrusions. Many serious accidents result from crane operation when a protrusion catches on an H beam. Accordingly, sufficient care is needed when moving clamps hanging from a crane's hook, even when there is no load.

POINT Even when providing assistance for work not requiring a license, make sure to get special training and understand the dangers before engaging in the work.

Q7 I got hurt due to my own fault when processing steel sheet. Now I am not allowed to do press operations. Why?

A7 In order to engage in dangerous work, you must first receive sufficient safety training and learn the dangers and the structure of the machines you will use as well as the safe way to use them.

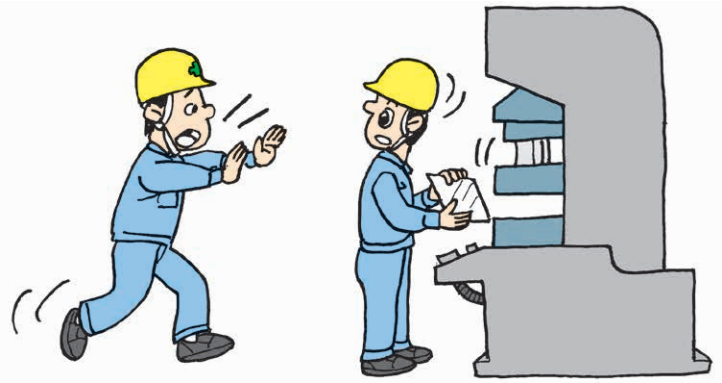
Also, the scope of work you can engage in is limited depending on the type of skills you have acquired. Persons currently receiving technical training in welding operations cannot perform press operations.

Work that technical intern trainees in welding operations cannot do.

Just because the company is busy does not mean that you can do any kind of work.

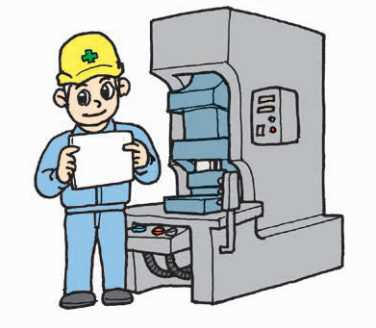
Technical intern trainees cannot engage in work not included as part of their technical training plan.

* Engaging in work not included as part of your technical training plan greatly increases the chance of a serious accident. There are frequent instances of trainees having to give up their training and return to their home country because of such an incident.



Examples of work that trainees in welding operations cannot do as a general rule

- Use a press machine to process components that will be welded, as a preparatory step before welding
- Use a spray gun to paint welded components, as a step after welding (excluding rust-proofing)



Press

Painting

Q8 The cleaning of machinery can be done more efficiently while the machinery is running. Why must we stop machinery before cleaning it?

A8 The severity of accidents involving machinery is particularly high. Entanglement of hands or other body parts caused by cleaning machinery that is running can result in serious disabilities and even death. That is why Japanese law requires machinery to be stopped before it is cleaned.

- Before cleaning, oiling, repairing, or adjusting machinery, turn off the machine, and make sure that it is fully stopped. Only then proceed with the work.

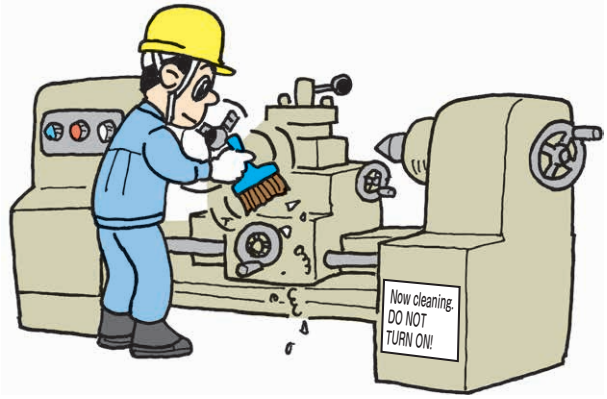
- After turning off a machine, lock the starting system and put up a sign to prevent others from turning on the machine.

- Never wear gloves when working with machines such as lathes, milling machines, or drill presses, as this could result in a serious accident involving entanglement in rotating blades or machining chips.

- Just in case, practice stopping machinery using the emergency stop switch.

The following are not acceptable excuses!

- But production efficiency drops if the machinery is stopped.
- I always do it that way, so it's okay.
- It's troublesome to stop the machinery.
- I'll be careful, so let me finish this work quickly.



Q9 When I was picking up some materials that had fallen on the floor, a forklift that was backing up hit me and I got injured. What should I have been careful of?

A 9 Forklifts are a familiar sight, but they are also powerful machines. The basic rule is to not enter places where a collision is possible. When that is not possible, a guide must be assigned to the forklift to manage safety and ensure there are no blind spots.

a. Keeping things tidy and in order is the basis of safety. There will be no collisions if safety aisles and traveling lanes for forklifts are completely separate. Do not put things in safety aisles. Do not put things that would be in the way in traveling lanes. That's how to avoid accidents.

b. There are spots that cannot be seen from the driver's seat of a forklift. The load obstructs the view when going forward. There are blind spots when backing up. Never take a shortcut or cut across an area.
The driver is not expecting this, and you could be in a blind spot. It is very dangerous.

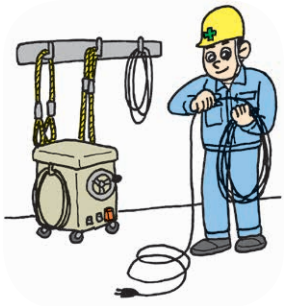
Q10 What are 3S activities? Are they done every day?

A 10 The 3Ss are the safety activities that include seiri, seiton, and seisou.

Seiri Sorting
Seiton Setting-in-Order
Seisou Sweep/Shine

They are called the 3Ss (san-S) because all three of these Japanese words start with the letter S when written using the alphabet.

It is important to carry out the 3Ss every day to create a proper work environment for everyone and to make dangerous areas clearly visible.



Seiri (sort)

Conduct safety inspections on hand tools, make usable things easy to use, and dispose of unusable things.

Seiton (set in order)

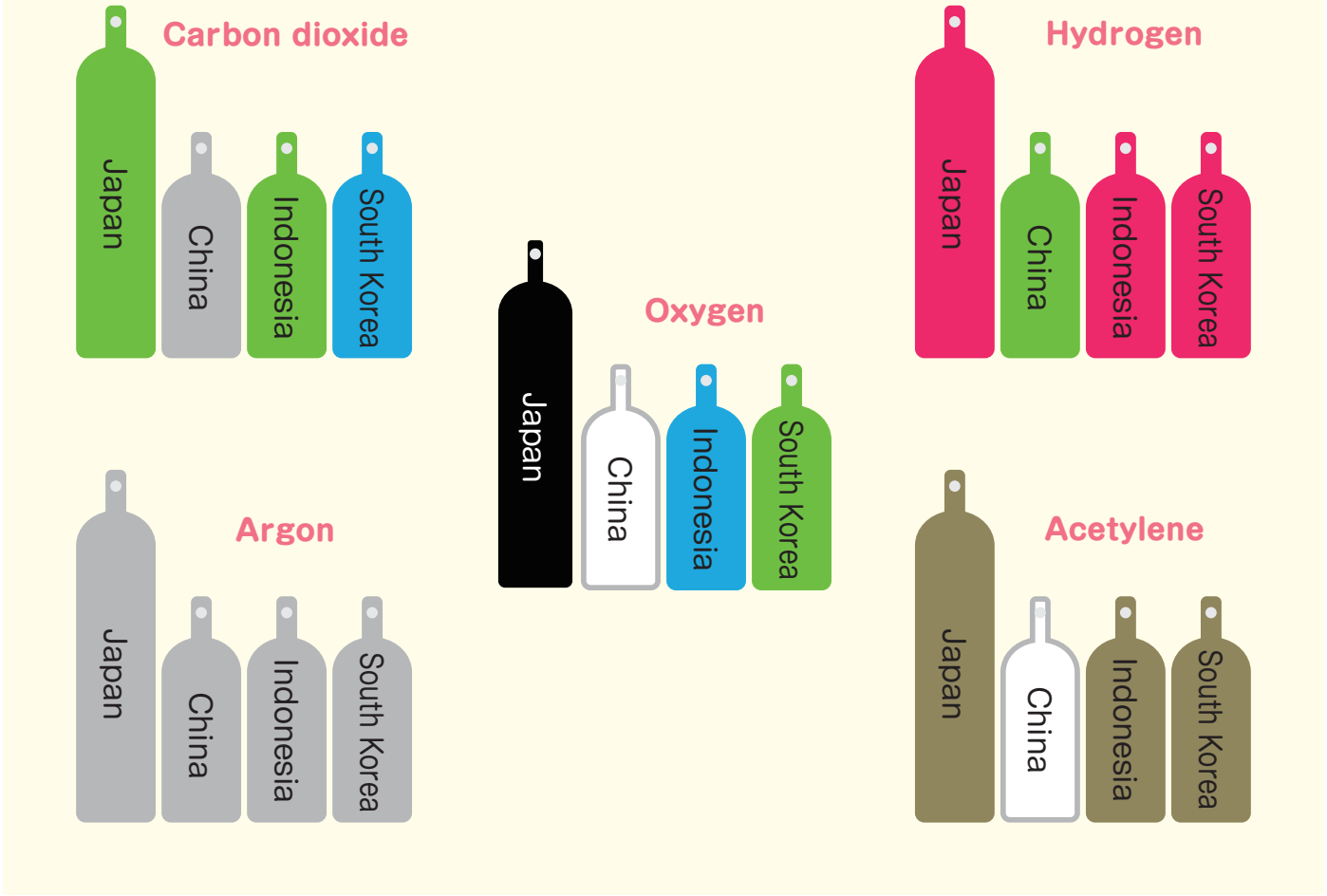
Properly put things back where they belong so that they are easy to use.

Seisou (sweep/shine)

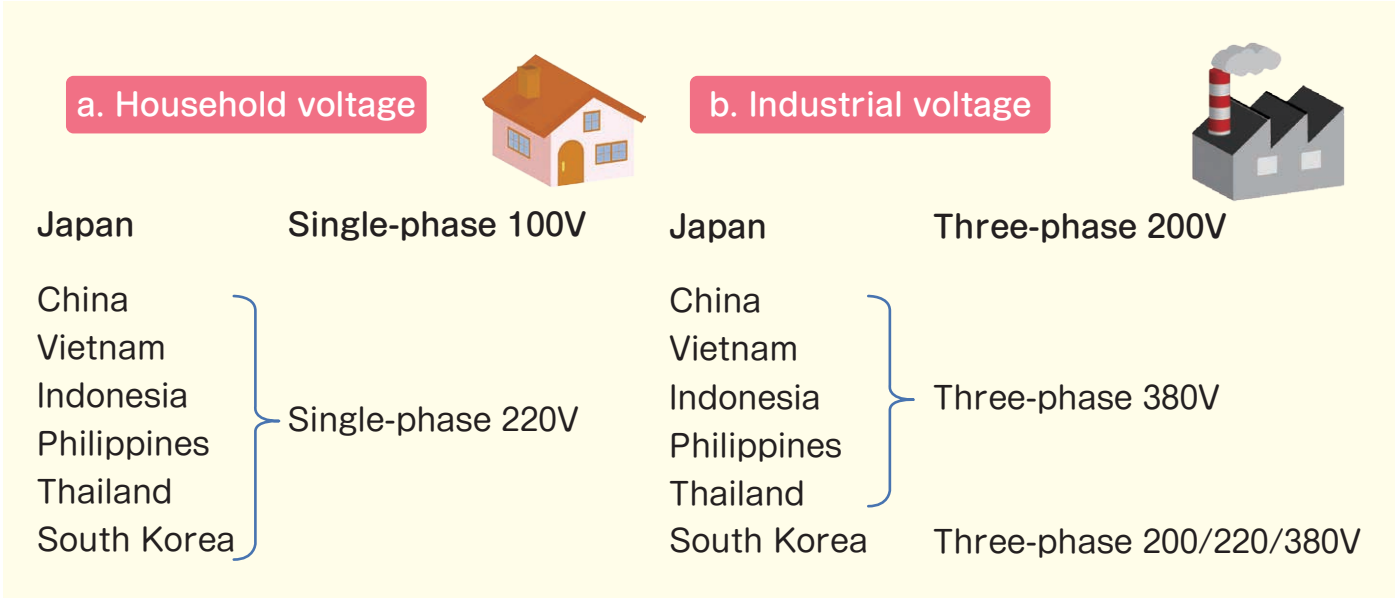
When the floor and aisles are clean, people do not slip or fall.

4 Know the Welding Situation in Japan

(1) Gas cylinder color: Differs by country. Check the colors used in Japan.



(2) Power-supply voltage in Japan and Asia: Be careful handling electricity, as the frequency and voltage differ by country.



5 Four Points to Avoid Accidents

Lastly, we ask that technical intern trainees observe the following four points to avoid accidents.

1 Fully understand the information necessary for work.

That is difficult unless you can understand the subtle differences of nuance in Japanese to a certain degree.
The quickest way to improve your Japanese is to use it in your everyday life. Start by saying greetings in Japanese.

2 Always turn machinery off before conducting maintenance or removing accumulated dirt.

Machinery does not stop immediately when you press the stop button.
Do not touch the machinery until checking that it is perfectly still.
When working on a machine that is turned off, you need a sign such as, “Machine Turned Off. DO NOT Touch the Switch!”

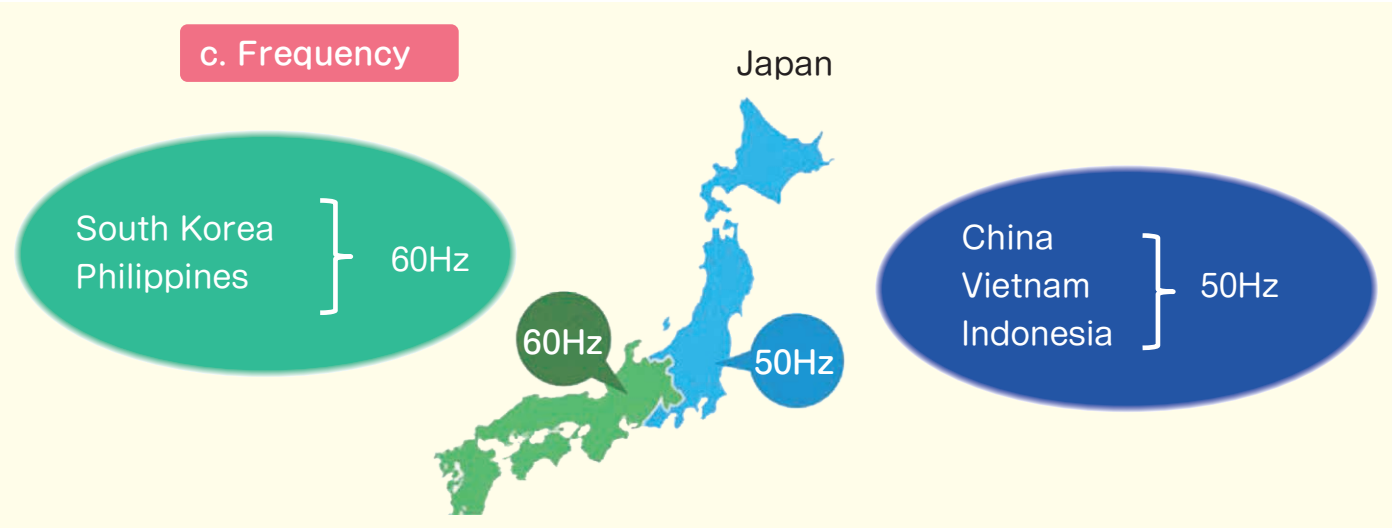
3 Develop the habit of thinking for yourself about whether something is dangerous.

It is important to think before doing something. Think first, then act, because there are dangers all around.
It is very important to keep information up to date and to use your own judgment.

4 Enjoy sports.

Although you move your body every day during work, that also causes stress.
Life is more than just work. You must also move your body in fun ways and enjoy yourself wholeheartedly.
Enjoy playing sports with your friends!

We hope that you will take the initiative on these four points, develop your skills, return home happy and healthy, and play an active role there.



6 Checklist Explanations

Safety Glasses

1	Safety glasses exist to protect the eyes from different kinds of dangers, including the intense light and harmful rays in welding and cutting operations, substances that irritate the eyes such as dust, and flying objects such as machining chips, flying particles, and mist.
2	There are a variety of types of safety glasses for different purposes to protect the eyes from flying objects, flying dust, airborne dust, liquid spray, etc. Use safety glasses that are suited to the task.
3	Choose light-shielding protective eyewear suited to the work environment to protect your eyes from harmful light produced during arc welding and thermal cutting. Light-shielding protective eyewear can be either safety glasses or a safety mask.
4	The degree of hazard of harmful rays differs depending on the kind of welding or thermal cutting and the conditions. When using safety glasses, choose and correctly use lenses and safety mask plates with a light-shielding number suited to the work environment.
5	Choose glasses that fit your face.
6	The majority of injuries to the eyes occur from foreign objects entering through gaps on the side. Use safety glasses that have side protection.
7	Injuries occur not only from flying objects such as metal but also the spray of chemicals such as paints and harmful rays produced during welding (ultraviolet rays, infrared rays, etc.) entering from the side.
8	If the lenses are bad they could break or get scratched and end up hurting your eyes.
9	You must wear goggles or fit-over glasses over your prescription glasses.
10	a. Check for abnormalities such as dirt, cracks, breaks, or deformation. If there are any, change the glasses. b. If the glasses are loose or rattling, tighten the screws appropriately.
11	If several people use the same pair of glasses, they can start to feel uncomfortable, like they do not fit, leading to an accident.
12	Following the user manual, clean your glasses after use to remove dust and dirt.
13	a. When putting safety glasses down, do not put the lens/eyepiece-side facing down. That could make them dirty or scratched. b. Store the glasses in a soft bag or case so that the lenses/eyepieces do not directly touch other objects.
14	Replace the glasses if there are abnormalities such as dirt that doesn't come off when washed, scratches, breaks, or deformation.

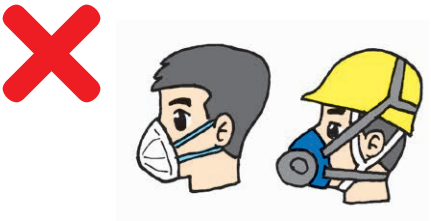
Dust Masks

1	You cannot choose an appropriate dust mask if you do not know the different types of dust.
2	Masks for dry conditions do not perform well when there is oil mist. In this case, choose a mask designed for oil mist.
3	Choose a gas mask with an anti-dust feature equipped with a chemical cartridge respirator.
4	It is necessary to know whether or not a mask is suitable for the work to be carried out.
5	Use a replaceable mask when doing work involving highly hazardous dust.
6	It is important for a mask to fit your face. If contact with your face is not maintained, you will inhale dust. Do a fit test to make sure your mask fits.
7	Nowadays, there are masks that have a built-in fit checker. Use the fit checker, as it is an easy way to make sure a mask fits every time you wear it.
8	If you can breathe easily when you cover the mask's air inlets with the palms of your hands, then there is a gap and the mask does not fit. Most of the time it is possible to get the mask to fit properly by moving it up or down or adjusting the strap.
9	The time to change the filter is determined by the color of the filter.
10	The strap must not be put around the ears as is done with a gauze mask. Put the strap directly around the back of the head.
11	This makes it easy to breathe even when wearing the mask.
12	Do not manage masks by yourself. The person responsible for their management must check them.

Mask with a built-in fit checker

If you have a mask with a built-in fit checker, you can easily perform a fit test after you have put the mask on. This is a very effective way of making a habit of checking that your mask contacts your face fully.

Put the strap directly around the back of your head.



Put it over your ears and helmet.

JITCO

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