

SAFETY HANDBOOK





Table of contents

Foreword	4
Your safety duties and responsibilities	6
Personal protective equipment	10
Life saving rules and stop work authority	18
Safety of simultaneous operations	20
Workplace safety	
Working in the office	22
Working in factories and workshops	25
Working on-board	26
Asbestos	27
Working in power plants	28
Working at height	
Personal fall protection	29
Elevated walkways and working platforms	30
Grating/floor plate removal.....	32
Scaffolding	34
Ladders.....	36
Stairs.....	37
Slips and falls	37
Lifting and hoisting	37
Manual lifting/handling	41
Lifting gear	44
Steel wire rope slings.....	44
Chain slings.....	45
Connecting links, master links and hooks	45



Chemicals

Safe handling of chemicals	47
Table of placards	49

Confined space

Safe entry to confined space	52
------------------------------------	----

Lock out/tag out.....

Working on electrical systems

Working with hydraulic systems

Pneumatics

Tools and plants

Welding and flame cutting	61
Workshop machine tools	64
Drilling	65
Turning	66
Milling.....	67
Grinding	68
Chromium plating	69
Foundry	70

Emergency

Emergencies	71
Travel safety, security and medical care	77

Foreword

The purpose of this Handbook is to offer assistance and guidance for performing work safely, at the job site, in factories or workshops, or in the office.

Safety is one of Wärtsilä's main values. Our culture and policies require us to have hazard-free workplaces, both for our own employees and for our contractors. We do this by applying high standards of occupational health and safety.

To emphasize the importance of safety, Wärtsilä has set a target of achieving zero lost time injuries. This means that all hazardous situations should teach us something. It also means that we all need to be involved if the target is to be reached. Injuries don't just happen by chance or coincidence, and all accidents are avoidable.



This Handbook provides a quick guide and summary of the minimum, basic safety practices to be applied worldwide by Wärtsilä personnel, without overriding any local additional rules and regulations. Local regulations should always apply in addition to these corporate guidelines.



Your safety duties and responsibilities

Be prepared by knowing in advance what to do, when to act, and how to act in any incident or emergency.

Know exactly what to do in unexpected situations.

Your responsibilities are to:

- Comply with our, and our customers' safety and environmental policies and rules.
- Report risks, near misses, injuries, and any defects or failure of tools, equipment and/or vehicles.
- Do not walk by
 - intervene in unsafe acts and conditions.
- Operate tools, equipment, and vehicles in a safe manner.
- Undergo regular medical check-ups.
- Be properly and sufficiently trained on the use of equipment required for your work.
- You must always wear personal protective equipment and work clothing supplied by Wärtsilä.
- Get fully acquainted with all tools/machinery/equipment that you are to use and read thoroughly the relevant technical manuals.
- Do not change or remove any warning, forbidden or command signs, or any barrier or hazard marking.





- Smoke only in authorized designated areas.
- A clean work place will prevent accidents. Keep your area clean and in good order.
- Do not work under the influence of drugs or alcohol.
- Bring only the necessary equipment to work assignments.
- Study and memorize the exit routes for quick escape in case of emergency.
- Do not leave openings/gaps that could lead to accidental falls.
- Do not perform maintenance/repair/inspection activities on moving parts of a machine, unless it has first been shut down.
- Do not start the work without risk assessment or required work permit.

If you notice an unsafe practice or errors which can be hazardous to health and life, immediately report the hazard to your superior at the work-site. This will enable your team to conduct corrective action to eliminate the hazard.

Regardless of our respective roles and responsibilities, it is everyone's duty to prevent harm or injury to ourselves or to others and to prevent damage to the environment.

When you receive a job order, conduct the following safety check:

1. Think about your capability of conducting the job.

- Did I understand the job assignment?
- Are my and my co-workers' roles clear and understood?
- Am I fit and competent to work?

If you answered 'NO' to any of these questions, do not proceed with the job order.

2. Conduct a risk assessment.

Identification

- What are the hazards of the job?
 - slip, trip or fall
 - getting burned
 - dropping or protruding objects
 - hazardous chemicals
 - pressurized systems and tools
 - unexpected start
 - up of energized system
 - moving vehicles and loads
 - confined spaces
 - simultaneous and overhead work
 - electrical shock
 - collapse
 - noise, radiation, heat or cold

Evaluate the risks

Consider the existing safety controls at the workplace and evaluate the probability and severity of each identified hazard. Are these risks acceptable or not?

Always perform at least a quick basic risk assessment before starting a job.

Developing control measures

You have to develop a control measure for all unacceptable risks. Consider this hierarchy:

1. Can I eliminate or substitute the hazard?
2. Can I reduce the risk by engineering?
3. Can I isolate the area or reduce the exposure?
4. Can I control the risk by appropriate work procedures and permits?
5. Can I control the risk by using personal protective equipment?

3. Be prepared for the work.

Before starting the job, assure that agreed safety controls are in place and work instructions are clearly understood.

- Am I aware of the procedures relevant to first aid and fire fighting?
- Am I skilled enough to operate the equipment I have to use?
- Do I know the work, environment and safety procedures?
- Can I handle the work alone?
- Do I have the required work permits?
- Do I have proper communication with others who could possibly be affected by my work?
- Am I wearing the required personal protective equipment?
- Am I using the correct tools and equipment required for the work?

4. Proceed to complete.



Personal protective equipment

Use the personal protective equipment provided to you for your work. It is designed to reduce and prevent the chances of injuries occurring at work. It's your responsibility to use the required PPE for each activity.



A Safety Notice Board with a list of mandatory personal protective equipment is installed at the entrances of Wärtsilä's factories and workshops. Wear the recommended personal protective equipment. Only personal protective equipment supplied by Wärtsilä should be used/worn, and it should be maintained in good condition throughout its prescribed life span.

LOCAL LANGUAGE WÄRTSILÄ XXX WORKSHOP - YYY DEPARTMENT LOCAL LANGUAGE PERSONAL PROTECTIVE EQUIPMENT MUST BE WORN			
LOCAL LANGUAGE EMPLOYEES & CONTRACTORS		LOCAL LANGUAGE VISITORS	
 FIRST LANGUAGE WORK CLOTHES	 FIRST LANGUAGE SAFETY SHOES	 FIRST LANGUAGE SAFETY HELMET IN XXX AREAS	 FIRST LANGUAGE SAFETY SHOES
 FIRST LANGUAGE HEARING PROTECTION IN XXX AREAS	 FIRST LANGUAGE SAFETY GLASSES IN XXX AREAS	 LOCAL LANGUAGE ACCESS PROHIBITED IN XXX AREAS	



Wear protective clothing



You must wear work clothes that do not cause a risk of injury. Protective clothing made of suitable materials are available for different jobs, such as work carried out by mechanics, machinists, painters and electricians. Correct clothing provides protection against:

- Heat and fire
- Cold
- Chemicals
- Static electricity
- Dust or gas
- Molten metal splashes

Work clothing that is too loose or torn may get entangled in overhanging projections or moving machinery. Dirty work clothes may stain the skin and clothes worn underneath, and will catch fire more easily than clean clothes.

In special working situations, like high traffic or dark areas, work clothes should be integrated with high visibility safety jackets.



Wear safety shoes



You shall wear Wärtsilä supplied safety shoes/boots in operational activities and ensure that they are:

- Metal toe capped to protect you when handling heavy objects.
- Properly insulated so that you will be protected against cold, moderate heat or electric shock.
- Puncture proof to protect you against sharp objects.
- Antiskid to safeguard against slips, trips, and falls.
- Antistatic to avoid sparking in explosive atmospheres.
- Chemical resistant when you are working with chemicals.

Different types of footwear are available for different jobs. Make sure your work clothes are undamaged and of the right size.

Wear safety gloves



You must wear safety gloves at work to reduce risk of exposure to chemicals, or when handling equipment, machinery, hot objects or objects causing a mechanical hazard. It is highly recommended to wear safety gloves at work, however you are obliged to wear safety gloves when dealing with the following:

- Wire ropes and slings
- Welding
- Chemicals lashing equipment
- Fillings and sharp materials
- Grinding
- Hot items

The various types of safety gloves includes the following:

- Vinyl, rubber or neoprene gloves give protection against different types of chemicals.
- Leather gloves give protection from heat, rough objects, and sparks.
- Insulated/fire retardant gloves will serve as a barrier against electricity, heat/cold and open flames.
- Fabric gloves are used when working with slippery objects or to avoid dirt or splinters.
- Metal mesh or kevlar gloves should be worn in special cases of continuous handling of very sharp objects.





Wear eye protection



You must wear eye protection when:

- Grinding
- Drilling
- Welding and allied processes
- Operating hydraulic or pneumatic tools and systems.
- There is a risk of splinters, particles, splashes, sparks and/or intense light that may cause eye injuries.
- Handling chemical agents.

Safety glasses provide the basic eye protection in the working areas. The safety glasses must fit tightly. Ensure that they have been cleaned properly and checked for cracks and scratches.

For welding, use specific welding goggles or mask. For grinding and working with hydraulic hoses, use face shield.

People working close to you are also required to use eye protection.

Wear safety helmets



Helmets must be worn when necessary or recommended, to protect the head from falling objects, flying objects (sliver and fragments), and against contact with sharp objects/obstacles, protruding parts, etc. Long hair should be kept tucked inside helmets. Helmets should be regularly inspected for cracks in the shell. Stickers, paint, etc., that might damage the material and hide cracks should be avoided. Damaged helmets or helmets with an expired date shall be replaced immediately.

Sunlight deteriorates helmet effectiveness, and the helmet should be changed regularly when working under the sun.

Bump caps can be used as an alternative PPE to protect the wearer's head against injuries, caused by striking the head against hard stationary objects. They are NOT intended as protection against falling objects, for which the safety helmet is needed. These bump caps can be used when working in confined spaces (for instance inside an engine crankcase) and anytime a standard helmet constrains and/or is an obstacle in special working conditions.



Wear hearing protection



Hearing protection shall be made available when the noise level is over 80dB (A). Hearing protection shall be used in areas where the noise level is over 85 dB (A).

Long-term exposure to excessive noise level will gradually lead to a hearing loss. Hearing loss can be caused also by sudden high level noise.

Earplugs, canal plugs and earmuffs can be used as personal hearing protectors. Confirm the protection level of each protector.





Wear respirators



You must wear respirators in areas where airborne impurities cannot be removed locally. The respirator must be such that its filtering method is suited to the particular application or area of use (breathing hood using compressed air, powered air purifying respirators, full face mask or dust mask).

Wear flotation vest



Life jacket/personal floatation devices (PFD's) are to be used when working on board ship, in dry docks, and exposed to a risk of falling to the water and drowning.

- The Life Jacket must be properly inspected, tested and maintained per the manufacturers' recommendation.
- Use only CE, ANSI and Coast Guard Approved Personal
- Floatation devices and life jackets.
- Life Jackets and personal floatation devices must be properly stowed.

PFD's shall be worn when boarding a vessel at sea and when working near or above water without proper railing.

Life saving rules and stop work authority

- Wärtsilä **10 life-saving rules** are put in place to ensure that consistent behaviors are followed to prevent incidents that could result in **a serious injury or a fatality**.
- The life-saving rules apply to all **workers and partners** involved with our business operations or visiting our premises.
- Wärtsilä has **Zero tolerance** regarding violations of Life-Saving Rules. Each Wärtsilä company has a disciplinary procedure in place to address safety violations.

Stop work authority

- All employees have the **responsibility and authority** to **intervene** and **stop work** in unsafe situation.
- The employee is required to immediately report the Stop Work case to its line manager/site manager and customer representative, and ensure that the case is registered in the relevant reporting system.
- Employees shall not resume work until all the hazards with unacceptable risks have been brought under control to **an acceptable risk level**.
- Wärtsilä is committed to Stop Work Authority by preventing any retaliation in response to exercising this authority.



WÄRTSILÄ

Stop Work Authority

Wärtsilä is committed to create and maintain a safe and healthy workplace for our employees and partners in all of our business operations. It's everyone's responsibility and authority to intervene and stop work in an unsafe situation. You have the full support of Wärtsilä Management to exercise the authority to stop work.

Håkan Agnevall
President & CEO
Wärtsilä Corporation





Travel emergency, call +44 (0)20 3859 4494
wartsilatravelsupport@anvilgroup.com

Life-saving rules

Everyone has the responsibility and authority to **intervene** and **stop work** if they observe non-compliance with the life-saving rules or any other unsafe activity – **stop and care**.

Work with a valid work permit / JSA when required



Co-ordinate simultaneous operations to prevent potential safety conflicts

Verify isolation when working on energized systems



Always use equipment that is fit to its intended purpose

Ensure safe conditions before entering a confined space



Protect yourself against a fall when working at height

Obtain authorization before overriding or disabling safety critical equipment



Wear required personal protective equipment

Stay out from under suspended load



Wear your seat belt and comply with road safety rules

Safety of simultaneous operations

Simultaneous Operations (SIMOPS) occur when two or more **potentially conflicting** activities are executed in the same work location at the same time. These operations may involve work team(s) from Wärtsilä, the customer and different contractors. Typical tasks exposing other teams at risk are but not limited to:

- Lifting and hauling activities
- Working above others (dropping objects)
- Use of high pressure hydraulic tools
- Painting or use of other hazardous chemicals
- Erecting or dismantling scaffolding
- Tasks requiring removal of floor plates or railings
- Handling of liquid or gas fuels
- Pressure testing & operating pressurized systems
- Tensioning of wires or cables
- Work requiring to disable safety systems
- Work in confined space
- Electrical work and hot work
- Diving activities
- Operating vessel or barges (moving, ballasting)
- Use of heavy industrial equipment like excavator



The risks associated with simultaneous operations can be managed through proper **planning, communication and supervision**. When simultaneous operations are involved, it's crucial that **all parties** involved are **meeting** regularly to assess and discuss all activities undertaken, and how they will impact on each other, following these steps:

- Identify all tasks planned to be executed within the same area
- Identify the main hazards associated with these tasks – individually and collectively
- Limit the number of simultaneous operations in any given area when conflicts identified
- Identify time frames and locations for the tasks
- Agree who is supervising the simultaneous operations and single tasks / teams
- Consider if any activity requires a permit to work or job safety analysis and co-ordinate implementation
- Identify any safety measures, which shall be implemented prior and during the simultaneous tasks (barricading, lock out & tag out, etc.)
- When barricading of hazardous area is required, solid / hard barricading or locking procedure (with warning signage) is the principal method to restrict personnel access to hazardous area
- Ensure that Wärtsilä life-saving rules are followed
- Identify communication methods for the activities / teams
- Emphasize that all parties have authority to stop work at any time if there is unclarity or risks within simultaneous tasks
- Ensure that all involved personnel have been informed of the schedule and any potential constraints and required safety measures.

At a customer site / vessel, a daily co-operation practice should be requested and implemented if more than one team is working at the same work area with Wärtsilä.



Working in the office

A good working posture and proper physical movement at work are very important for preventing work-related physical injuries and accidents. Therefore, choose appropriate working methods that are as safe as possible and which impose as little strain as possible to your body.

Pay attention to your working methods and make suggestions for improvements at your workplace.

Tips for healthy and safe working:

- Use available working aids for the job.
- Use braces to support proper posture.
- Use tools that are suitable for the job to be performed.
- Organize your work.
- Change tasks in order to change position.

Even when working in an office, one's work might have a huge impact on the safety of a factory, ship installation or power plant, and therefore it is also important to understand the environment upon which one's decisions are having an impact.

Check list for office ergonomics

Your workstation

- Keep materials that you need for work within easy reach.
- Make sure you have enough space on both sides of your display for easy placement and access to the items you need.
- Keep the space below the desk free from any unnecessary items.

Adjusting your chair

- Check the height adjustments of your chair while seated. Use your options.
- Adjust the chair so that your feet rest flat on the floor.
- Set the depth of the chair in such a way that the front edge of the seat doesn't press on the back of your knees.
- Set the backrest angle. The backrest should especially support your lumbar area.
- The load on your lower back is reduced when your hip angle is more than 90 degrees.
- Set the armrests so that your shoulders are relaxed and your arms are close to your body.
- Your forearms should rest on the armrests.
- Sit all the way back in your chair.

Keyboard and mouse

- Sit as close as possible to your desk.
- If the arm supports of your chair hit the work surface, lower them (so that they fit under the table) or remove the arm supports.
- Keep the keyboard tilted, i.e. use keyboard supports.





- Adjust the distance between the keyboard and the screen in such a way that you can see both by simply switching your gaze.
- Rest your forearms on your desk/arm supports.
- A wrist support helps to keep your wrists straight. Keep the mouse close to the keyboard and your elbows closer to your body.

Adjusting your desk

- Adjust the height of your work surface so that your forearms can rest horizontally on the desk.
- If it is not possible to adjust the work surface, adjust the height of your chair. You might need a foot rest.
- The basic idea is that your feet rest flat on the floor. Use the foot rest only when needed.

Video display unit

- Adjust your monitor height so that your line of sight in your regular seated position is near the top of the screen.
- If needed, use a document holder next to the display.

Working in factories and workshops

- Do not enter a factory or workshop without a permission of the area supervisor.
- Take some time to inspect the Safety Notice Board which has the list of specific risks and mandatory PPE. This is installed on all workshops and relevant access areas.
- Clean all workshop tools/machine tools at regular intervals.
- Ensure that adequate fire extinguishers, in good working order, are positioned in key areas of the workshop according to local laws and regulations.
- Adequate walkways are essential. Emergency exits must be available and marked visibly for easy access.
- Regular programmed inspection and maintenance intervals should be complied with for all machinery, in addition to routine daily inspections made.
- Safety guards shall not be removed without the permission of the supervisor.
- No employee should work alone in a workshop.
- Beware of forklifts and overhead cranes in motion.
- Do not wear dangling necklaces, bracelets, keychains and other jewellery.



Working on-board

- When at sea, the ship's captain is responsible for the safety of everyone on-board. He or his delegate must consent to the start and end of any service activities to be performed on-board.
- Ask for the emergency procedures when boarding a vessel.
- Prevent the dispersion of fuels/lubricants/refrigerant fluids into the sea, as well as to on-board workplaces.
- Promptly inform the captain or his deputy of any doubt/concern as to the safety of the ship and its personnel. Also remember to inform your superior.
- Life jackets must be worn whenever there is a risk of falling into water as drowning is one of the risks involved when working on board ship.
- Always verify that the life jackets supplied are in good condition.
- When working on ships in dry docks, always make sure that suitable railings, catwalks, and scaffolds are fitted in the work/access areas where you have to operate to avoid accidental falls.
- When working at dry-docks and ship yards, always wear a helmet. Make sure that nobody is performing operations that could cause objects above to fall.





Asbestos

Thermal insulations of engines and boiler exhaust gas systems (as well as gaskets located in high temperature areas and which do not have a replacement interval), delivered approximately before **1997**, may contain asbestos fibres (Wärtsilä products). Besides engine systems, materials with asbestos may also be found in other ship or plant structures and components. From 1 January 2011, new installation of materials which contain asbestos has been banned for all ships.

- Always request written **asbestos free declaration** from customer's authorised representative, and do not perform any work if there is reason to suspect exposure for asbestos.
- In case any asbestos is present in the installation, the customer shall have a documented **maintenance and monitoring programme** and materials have to be **clearly labelled, sealed, undisturbed and well managed**.
- **Do not disturb** any components identified as containing asbestos.
- In case of the possible presence of asbestos in components on which one is working or if there is another reason to suspect exposure to asbestos, suspend activities by Wärtsilä **Stop Work Authority** and alert the customer's representative.
- The work can be continued only when situation is clarified and possible asbestos content or contamination is removed by certified company or controlled effectively.
- Wärtsilä has set up a global **clearance criteria of 0.01** asbestos fibres/cc in the air which shall not be exceeded in case air monitoring is required to assure safe working condition.

Working in power plants

- Do not operate power plants, nor open or close valves that are not included in our scope of work, and without the permission of the customer.
- Work permits may be required for several activities, like hot work, confined space entry, lock out/tag out and electrical work.
- Lock out/tag out guidelines have to be followed strictly when conducting maintenance of mechanical, electrical or pressurized systems.
- Beware of forklifts, trucks, cranes/crane trucks, tank trucks in motion.
- When using forklifts, never over load them and always check the weight and capacity rules.
- Forklifts should only be operated by licensed forklift operators.
- If the equipment to be used has rotating parts or tools that could cause injury, make sure that it is correctly fitted with appropriate protective shields or barriers.
- Avoid contact with steam and chemicals, and never step on insulated pipelines and equipment.



Excavations/Earth

work activities in power plant installations can be hazardous to personnel. Non-essential personnel must stay away from the area.

- Sufficient handrails and fencing shall be installed around work areas, excavations, platforms, etc., wherever there is a danger of falling from a height of 2 meters (6.75 ft) or more.
- All floor openings that may create the risk of persons falling in or through them, are to be properly covered with a sufficiently strong covering or barricaded by sufficient handrails of at least 1 meter in height.
- Pay attention to excavations, open trenches and floor openings in order to avoid falls.



Personal fall protection

Personal fall protection systems shall be used when it's not possible or practical to install guard rails, for instance inside the crankcase of a 2-stroke engine or assembling exhaust pipes in test-cells.

Personal fall protection system consists of anchorage, connectors, full body safety harness and may include a lanyard, deceleration device, lifeline or a suitable combination of these.

- A personal fall protection system should always be used:
- While working on suspended platform or in a manlift basket.
- When working over the side.
- When exposed to the risk of falling more than 2 meters (6.75 ft).

Elevated walkways and working platforms

Unsafe condition in elevated walkways and working platforms may lead to a serious fall from height accident.

Risks on elevated walkways and working platforms:

- Removed or loose gratings, floor panels, kickplates or handrails
- Missing fastening bolts/clips in the grating/plate
- Oil or water making surfaces slippery
- Unsecured objects which could fall from height
- Working on fragile or sloping surfaces
- Working near holes, pits and shafts.

Observe actively the conditions of the elevated walkways and working platforms. If any unsafe condition is observed, **stop work** and **prevent access to the area effectively**. Report and request immediate corrective actions.

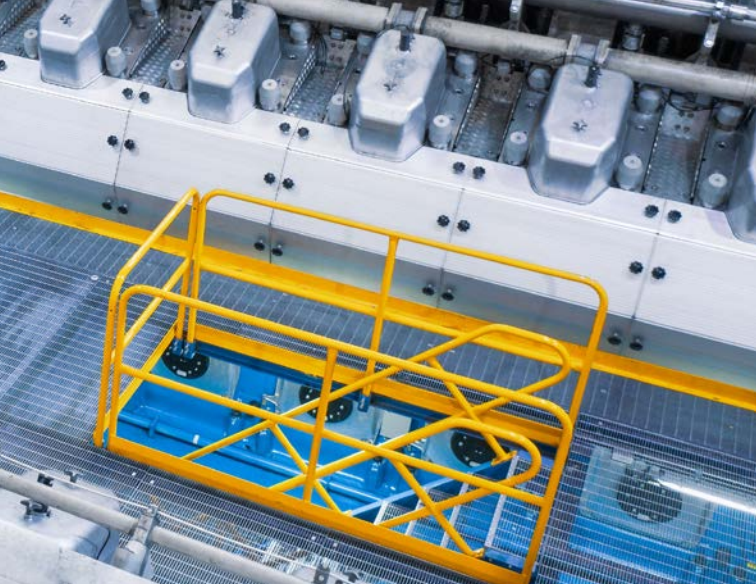
- Open holes shall be barricaded with guardrails or securely covered
- Clear away spills, drips and leaks of oil and water
- Remove all obstructions in the path
- Ensure adequate lighting
- Secure tools and materials to prevent falling from heights (lanyard or similar)
- Hold the handrails and watch your step
- Permissible load and reach limitations of the platforms should not be exceeded
- Regularly conduct inspections of gratings and floor plates
- Unsafe area below overhead works shall be barricaded.





Grating/floor plate removal

- Prior to the removal of any part of any access walkway or platform, a **Work Permit** or **JSA** must be completed and approved.
- Solid/hard barricades with kick boards where necessary and appropriate signage, shall be erected and maintained at all approaches to the area where the grating/plate is to be removed.
- Any personnel working inside the barricaded area shall wear appropriate **personal fall protection**.
- The area below the intended opening which may be affected by overhead hazards shall be barricaded.
- After work has been completed and prior to the barricade being removed, all grating or floor plates shall be checked to ensure that all the retaining clamps and clips released to remove the grating have been re-secured.

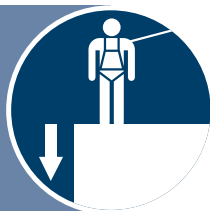


- Barricade tape does not provide any physical protection; therefore, it shall not be utilized to barricade an area where is a fall down hazard.

Temporary hole covers

- Has to be capable of supporting, without failure, the weight of employees, equipment and materials that may be imposed on the cover at any one time.
- Be secured when installed to prevent accidental displacement by wind, equipment or employees.
- Be color-coded or marked to provide warning of the hazard.

Protect yourself against a fall when working at height



Scaffolding

Staging must be adequate for the work performed because falls are a significant hazard. Therefore, the primary aim should be to eliminate the risk of falling from heights by technical solutions, like railings.

If this is not possible, you should use a personal fall protection system. When working at height, you should pay particular attention to cleanliness and order, because tripping might be fatal.

Before working on or near any scaffold, workers should ensure the following:

- Scaffoldings are safely secured and with adequate supports. Scaffoldings are provided with safe access ladders (portable, hook-on or attachable), stairways, stair towers, ramps, walkways and integral prefabricated frames.
- Scaffoldings are adequately docked (for example having a work surface and platform) and provided with guard rails.
- You should check that the staging or scaffolding is not overloaded. Maximum load capacity should be displayed on scaffolding tags.
- Scaffolds must be maintained in a safe and secure condition. Any component of the scaffold that is broken, burned or otherwise defective must be immediately replaced. Unstable objects such as barrels, boxes, cans or loose bricks must not be used either as working platforms or to support a working platform.
- When erecting, moving, dismantling or altering scaffolds, make sure that you are under the supervision of a scaffold competent person.
- Welding, burning, riveting, and open flame work must not be performed on any staging that is suspended by fibre and/or nylon ropes.
- Inspect all scaffolds and components upon their delivery to the erection location. Return and tag "Do Not Use" or destroy defective components. Inspect scaffolds before use and attach a tag stating the time and date of inspection.

- Inspect scaffolds before each work shift, especially after changing weather conditions and prolonged interruptions of work. Check for items such as a solid foundation, stable conditions, complete working and rest platforms, suitable anchorage points, required guardrails, loose connections, tie-off points, damaged components, proper access and the use of fall protection equipment.
- Mobile scaffolds constructed with tube and coupler components or of fabricated frames must conform to design, construction, and loading requirements.
- You should never drag hoses or cables over a ladder or across railings.
- You should never drop anything down from scaffoldings or other high places, unless the area below is being watched.
- When working near openings or near edges of a roof, and where guard rails are not present or missing altogether, you should wear a safety harness and use particular caution.



Ladders

Ladders are allowed only as a temporary access way or for short term tasks, like for rigging the load. Appropriate risk assessment needs to be conducted to confirm that the risk level is low enough when using a ladder.

Only proper ladders are to be used and they must be adequately secured.

When using ladders, you must ensure the following:

- They are secured at the top and bottom.
- They extend at least 1 meter (3.8 ft) above the support point. They are on a firm and level base. Make sure the ladders conform with the following:
 - They have been inspected for any defect.
 - They have anti-slip feet.
 - There are no missing, loose or broken rungs.
 - There is no noteworthy corrosion.
 - The ladder is braced to ensure that it will not move.

Remember to:

- Keep your weight in the centre.
- Use two hands when climbing and use a tool belt or holder. Face the ladder and keep your body within the confines of the ladder.
- Take necessary precautions when using ladders at heights over 2.0 meters (6.75 ft) as this is already considered as working at heights.
- No interlocking or extension ladder shall be used unless its sections are prevented from moving relative to each other while in use.
- A mobile ladder must be prevented from moving before it is stepped on.

Remember to always have three points of contact when going up or down ladders.

Stairs

Many accidents occur on stairs:

- Do not run up or down the stairs.
- Remove all obstructions in the path.
- Make certain the lighting is adequate.
- Make sure railings are secure and use them.
- Ensure the steps are not worn, slippery or loose.
- Hold on to hand rails.
- Do not carry anything that may entirely block your vision.

Slips and falls

Slips and falls are also major causes of accidents. Look out for missing gratings and railings. People have fallen from great heights simply by not looking where they are going. You can reduce risk by ensuring that:

- Spills, drips, and leaks are immediately cleared away.
- You use non-skid footwear.
- You use catwalks wherever provided.

Lifting and hoisting

Never go underneath a suspended load!

Too many lifting injuries occur. Most of them are the result of a failure or breakdown in the hoist, but are often also caused by incorrectly secured loads, which fall apart during lifting.

Phases of safe lifting:

1. Selection of lifting gear of the proper type and with a suitable lifting capacity.
2. Make sure that the hoist is equipped with an inspection tag. Whenever the inspection tag is missing, inform your superior.
3. Select a sling that is sufficiently long to ensure a safe lifting angle and an even load distribution.
4. Determine the weight and centre of gravity of the load, as well as how its weight is distributed on the sling legs.

5. Ensure that the hook on the hoist and the lifting gear contains a latch or other such reliable locking mechanism.
6. Select the route.
7. Ensure that the route is safe and available during the lift (e.g. walk the route first).
8. Secure the load and ensure load stability.
9. Cutting edges reduce the strength of lifting gear (especially webbing slings and round slings), suddenly causing a dangerous situation. Therefore, cutting edges shall be protected using edge protections.
10. Ensure that there is enough space between lifting points to maintain load stability.
11. Ensure the stability of the load (to avoid asymmetrical tension).
12. Don't allow the wire rope to slacken.
13. Don't climb on the load while it is being lifted.
14. Remember that the person in charge of the lifting must be able to control the lift throughout the operation.
15. First raise the load only slightly, check the load stability and all attachments.
16. Never attempt to rectify a tilting load by hand.
17. Don't lift or move the load over people, and don't leave the load suspended unnecessarily.



18. Always move behind the load, never ahead of it.
19. Don't make jerky motions, horizontal pulls or lifts, or drag the load over the ground.

Landing the load:

1. Check the landing place and support for the load, so that the lifting gear can be removed safely and undamaged.
2. Return the lifting gear to proper storage.
3. Store the lifting gear in the designated location. Remove damaged gear from use immediately.
4. Raise the crane hook high enough to ensure that it causes no injury (e.g. head injuries).
5. The lift is complete when the load is resting firmly in the new location (with no risk of falling or dropping).
6. A Crane Operator Course is arranged for persons performing lifting operations. If you have not taken the course yet, contact your supervisor. The course is organized by Wärtsilä Land and Sea Academy.

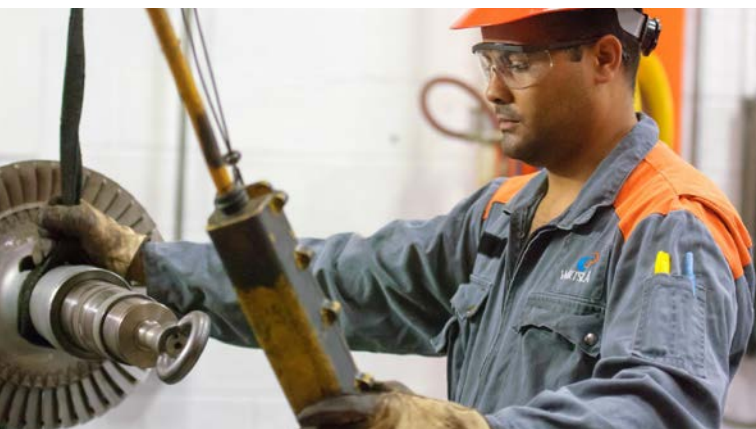
Only use hoists for which you have received training and guidance!



Customers'/Subcontractors' tools

When working on site, Wärtsilä personnel often use lifting equipment and specific tools belonging to the customer and/or to subcontracting firms, or equipment/tools on hire. Notwithstanding that the owner (customer or subcontractor), is responsible for the maintenance and periodic checks of this equipment, it is important that whenever taking any tool or equipment owned by third parties, one must always ask whether they are free and safe to use. And make sure that they, at least visually, appear to be in safe working order. In particular, a visual inspection must be made of the gear and moving system/parts protection, and of the integrity of the electrical insulation of electrically powered equipment. Also check the integrity of lifting accessories, such as cables, slings, chains, and hooks.

The tool shall never be tampered with in any way. Should it be damaged, malfunctioning, or with any defect, the tool must not be used and the customer's or company's reference person must be immediately contacted so that the necessary maintenance can be carried out. After an evaluation of the estimated weight of the cargo to be handled, always check the maximum capacity of the lifting device. This can generally be found on the specification labels/markings. Before handling loads using a lifting device owned by the customer and/or subcontracted companies, it is also a good practice to check that the start and stop commands are responding well.



Manual lifting/handling

- Back injuries are potentially the most permanent of common industrial injuries. Some of the products that the company makes are heavy and cannot be lifted or moved by one person The packing of products involves lifting or moving that cannot always be performed under optimum conditions and requires special care.
- Always make sure that there are sufficient people to assist in a lifting or moving operation. Use trolleys, lifts and hoists where possible and learn how to lift items safely. Beware, that even lifting light objects can cause injury if lifted at a wrong distance from the body, or if the angle or stance is wrong.

Manual lifting general rule

Actions	Think about	Ask yourself
L oad	The Load	Can it be broken down to more manageable sizes and weight?
I ndividual	You and your capabilities	Can I lift the weight safely?
T ask	The Task	Do I need to lift, can I use equipment or ask others to help me?
E nvironment	The environ- ment in which the load is being moved	Is my pathway clear, is there good lighting, is the route known?

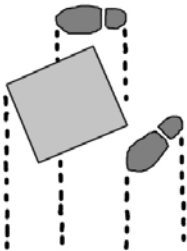
Good techniques

Stop and think



- Plan the lift. Where is the load going to be placed?
- Use appropriate handling aids if possible.
- Do you need help with the load?
- Remove obstructions such as discarded wrapping materials.
- For a long lift – such as floor to shoulder height – consider resting the load mid – way on a table or bench in order to change grip.

Preparation



- Place the feet apart, giving a balanced and stable base for lifting (tight skirts and unsuitable footwear make this difficult). The leading leg should be as far forward as is comfortable.
- Adopt a good posture.
- Bend the knees so that hands when grasping the load are as level with
 - the waist as possible, but do not kneel or over-flex the knees.
- Keep the back straight. Lean forward a little over the load if necessary to get a good grip.
- Keep the shoulders level and facing in the same direction as the hips.

Getting ready to lift

- Get a firm grip.
- Try to keep the arms within the boundary formed by the legs.
- The optimum position and nature of the grip depends on the circumstances and individual preference, but it must be secure.
- A hook grip is less fatiguing than keeping the fingers straight. If it is necessary to vary the grip as the lift proceeds, do this as smoothly as possible.



Lifting

- Don't jerk.
- Carry out the lifting movement slowly, keeping control of the load.

Placing the load

- Put down, then adjust.
- If precise positioning of the load is necessary, put it down first, then slide it onto the desired position.

Changing hands

- If you need to change your grip during the move, plan it first before doing it. Find an intermediate stage and re-adjust before placing at height.



Lifting gear

Lifting gear includes all equipment and components that are not permanently attached to the hoist, and which are used between the hoist and the load, or are attached to the load. Lifting gear includes, for example, lifting buckets, lifting beams, chain or wire rope slings, webbing slings and lifting tongs.

All lifting gear must be inspected at intervals specified by local regulations. Official inspection colours, or other appropriate systems, indicate if the periodic inspection has been carried out. In addition, each user shall visually inspect the lifting gear before use.

Note:

- Do not operate any lifting device unless you are certain that you know how to operate the device and are familiar with each phase of the lifting process.
- Do not overload the lifting gear; check its Safe Working Load (SWL) marking to make sure of its maximum capacity.
- Do not operate a hoist that lacks a marking indicating the maximum load or if it is uninspected or has other faults or defects. Instead, report the matter to your superior.
- Do not go beneath a suspended load under any circumstances.
- Always check the condition of the lifting gear before use.

Steel wire rope slings

Steel wire rope slings shall be inspected according to the manufacturer's instructions.

A steel wire rope sling should be rejected if it:

- Has a broken thread.
- Is worn by more than 10% in diameter.
- Shows internal corrosion.
- Has a distortion, such as a knot or a kink.
- Shows heat damage.
- Shows damage in the fittings (e.g. hooks).

Chain slings

Each link of the chain sling should be inspected separately, and the sling should be discarded if:

- The tag or label indicating the maximum load is missing.
- The master link, hooks or other structural components show bending, distortions, cracks or other defects, or if the hook has opened out by more than 10%.
- A link is worn by more than 10%.
- A link is bent or corroded or shows heat discolouration.
- A link contains nicks or cracks.

Connecting links, master links and hooks

Connecting links, master links and hooks should be discarded if:

- Master links are worn by 15% or more.
- The master link, hooks or other structural components show bending, distortions, cracks or other defects, or if the hook has opened out by more than 10%.



Do not use a webbing sling/round sling for service if:



Working load markings are illegible.



There is a knot in the webbing sling/round sling.



The sling stitching is ripped.



More than 10% of the warp is cut.



More than 5 % of the weft is cut.



The cut or friction damage exceeds 10% of the sling width.



The webbing sling/round sling is worn and dirty or shows chemical damage.



Core of the round sling is exposed.



The surface of the webbing sling/round sling has melted due to heat.



Safe handling of chemicals

There are many chemicals that you will be using and coming into contact with during the course of your work. These include paints, solvents, and cleaning agents. They can cause you temporary or permanent harm if allowed to enter the body.

Substances may enter the body in several ways:

- By swallowing.
- Direct skin contact and absorption through the skin.
- Breathing in gas, vapour, mist or dust.

Be aware of the precautions to be taken in order to safeguard yourself and others when carrying out work with such substances.

Here are some of the simple common sense rules to follow when handling, using or encountering chemicals.

- Read the material safety data sheet for the chemicals you are planning to use in order to select appropriate protective equipment and to understand the hazards involved in the use of each chemical.

- Use caution and remain calm when handling chemicals.
- Do not store incompatible chemicals together, and do not mix chemicals as it might result in a chemical reaction, fire and/or explosion.
- Observe the manufacturer's proper chemical storage recommendations.
- Store chemicals in their containers and keep their labels clean.
- Prevent exposure by using appropriate protective equipment (e.g. – eye protection, safety gloves and respirators).
- Use appropriate tools and safe work practices. Clean the spout and outer surfaces of chemical containers after use.
- Keep chemical containers closed.
- Wash contaminated skin immediately. If chemicals get into the eye, wash the eye thoroughly with clean water or an eye wash solution for at least 20 minutes. Seek medical attention if necessary.
- Before using a chemical, study the material safety data sheet for emergency procedures.
- Wash your hands before eating, smoking or going to the toilet, and when you have finished working.
- If you feel ill after handling chemicals, report immediately to the health centre.
- Report any fault or defect you may have discovered in the instructions to the Chemicals Safety Supervisor or other appropriate person.
- Report any accident or mistake that's taking place in the handling of chemicals to the area supervisor. Seek medical attention if necessary.

Table of placards



Explosives



Highly flammable



Oxidizing



Gases under pressure



Hazardous to the Marine life



Toxic



Carcinogenicity, germ cell
mutagenicity, reproductive
toxicity



Acute toxicity



Corrosive

Confined space

A confined space is large enough for personnel to enter, has limited or restricted means of entry or exit, and it's not designed for continuous occupancy.

A confined space may have one or more of the following hazards:

- **Risk of getting trapped** – Confined space openings are limited by size and location. Openings are usually small in size, and are difficult to move through easily. Small openings make it very difficult to get needed equipment in or out of the



space, especially lifesaving equipment when rescue is needed. There are also cases when openings may be very large, for example open-topped spaces such as a ship's hold. Access to open topped spaces may require the use of ladders, hoists, or other devices, and escape from such areas may be very difficult in emergency situations.

A confined space found in the workplace may have a combination of these characteristics, which can complicate working in and around such spaces, as well as hampering rescue operations during emergencies.

- **Unfavourable natural ventilation** – Because air may not move in and out of confined spaces freely, the atmosphere inside a confined space can be very different from the atmosphere outside. Deadly gases may be trapped inside, particularly if the space is used to store or process chemicals or organic substances that may decompose. There may not be enough oxygen inside the confined space to support life. Alternatively, the air could be so oxygen-rich that it is likely to increase the chance of fire or explosion if a source of ignition is present.

Hazardous atmospheres – The atmosphere in a confined space may be extremely hazardous because of the lack of natural air movement. This can result in:

- **An oxygen-deficient atmosphere** – lack of oxygen leads very quickly to unconsciousness and death.
- **A flammable atmosphere** – a mixture of the oxygen in the air and a flammable gas or vapour which can ignite.
- **A toxic atmosphere** – unless the confined space is certified as safe, always assume that any substance (liquids, vapours, gases, mists, solid materials and dust) in a confined space

can be hazardous. Toxic substances may range from fast acting poisons to long term cancer causing carcinogens.

Testing before entering confined spaces – It is important to understand that some gases or vapours are heavier than air and will settle at the bottom of a confined space. It is necessary to test all areas (top, middle and bottom) of a confined space with properly calibrated testing instruments to determine what gases are present. If the test result shows an oxygen deficiency, or the presence of toxic gases or vapours, the space must be ventilated and re-tested before entering.

Ventilation – by blower or fan, it is necessary to remove harmful gases and vapours. The ventilation should be continuous where possible, because in many confined spaces the hazardous atmosphere will form again when the flow of air is stopped. All access points are to be opened for ventilation and emergency exit.



Safe entry to confined space

You need to have appropriate work permit to enter a confined space if there is a risk of:

- Hazardous atmosphere or
- Getting trapped

The confined space permit defines the measures taken before and during the work. Only enter when you are sure that it is gas free and considered to be safe. Only remain inside for as long as it is necessary to carry out the work.

- Non-sparking tools and specially protected lighting are essential wherever flammable or potentially explosive atmospheres are likely to create hazardous conditions.
- An adequate communication system is needed to enable communication between people inside and outside the confined space. There has to be an attendant outside the confined space.
- Effective arrangements for raising the alarm and carrying out rescue operations in an emergency are essential.
- All equipment to be used inside the confined space must be inspected and tested to be in good working condition prior to entry into the space.

It is the full responsibility of the owner of the confined space (i.e. ship owner, shipyard) to ensure that the confined space is safe to enter. If you are not confident that a space is safe, you should report your concerns to your superior. Do not enter until all safety requirements are met.

Did you know that several fatalities have occurred when the attendant outside the confined space has tried to rescue the workers inside? The attendant has collapsed because of the toxic gases or lack of oxygen. Only professional helpers can enter the confined space in an emergency situation.

Lock out/tag out

Preventing uncontrolled releases of electrical, mechanical and other forms of hazardous energy.

This is to ensure that before you perform any servicing or maintenance on a machine or piece of equipment, all possible appropriate actions have been taken to prevent the machine from unexpected energizing, start-up or releasing of stored energy that could cause injury.

Before beginning work, carry out the following precautions wherever and whenever applicable:

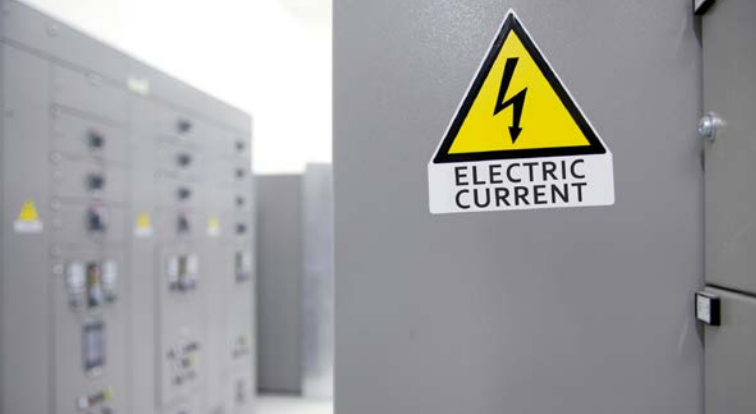
1. Ask permission for de-energizing the system.
2. De-energize all sources which may cause unexpected release of energy
 - Disconnect or shut down engines or motors.
 - De-energize and lock electrical circuits.
 - Block the fluid (gas or liquid) flow in hydraulic or pneumatic systems.
 - Block machine parts against motion.
 - Block or dissipate stored energy.
 - Discharge capacitors.
 - Release or block springs that are under compression/tension.
 - Vent fluids from pressure vessels, tanks or accumulators.
 - Use blind flanges for isolating flowing substances.
 - Never vent toxic, flammable or explosive substances directly into the atmosphere.





3. Eliminate the risk of unexpected release of hazardous energy by lock out/tag out procedure.
 - Lock out/tag out all forms of hazardous energy including electrical breaker panels, control valves, etc.
 - Make sure that only one key exists for each of your assigned locks and that only you hold that key.
4. Verify that the isolation succeeded.
 - Verify by test and/or observation that all energy sources are de-energized.
5. During the work.
 - You must perform regular spot checks in your work area, to ensure that the lock out/tag out procedure is being followed.

When working inside the crankcase of a diesel engine, or in the vicinity of the ship's propeller in dry dock, be sure that all supply systems such as starting air have been isolated, secured and tagged to prevent accidental or intentional start up by unauthorized persons.



Working on electrical systems

Follow the local regulations when working on or near electrical systems.

Only qualified and authorized employees are allowed to work on electrical systems, under designated supervision.

Work permit procedure has to be followed according to Wäertsilä's local guidelines or customer's requirements.

Working on live circuits shall always be avoided when possible. Live work should be applied only if:

- De-energizing introduces additional or increased hazards.
- De-energizing is not possible due to equipment design, operational limitation or testing conditions.
- Live parts are operated by extra low voltage.

The main safety principle is that the applied work practices must protect employees from contact with energized conductors; either directly with any part of their body, or indirectly through some other conductive object.

Working with dead circuits

An electrical device must never be assumed dead. Always assume it's live.

Qualified site/project personnel should determine case by case the correct de-energization of electrical systems.

De-energization and isolation

- Get permission to carry out the de-energization.
- Identify the correct operating location and device.
- De-energize the intended electrical system (switching).
Circuits and equipment under exposure must be disconnected by qualified personnel from all energy sources.
- Control circuit devices, such as push buttons, selector switches, and interlocks shall not be used as the sole means of de-energizing circuits. These devices do not substitute lock out/tag out procedure. Stored electrical energy that might endanger personnel must be released. This might include discharging capacitors and short circuiting and grounding high capacity elements.
- Isolate all sources of electric energy, following lock out/tag out procedure. All points of isolation should be locked off by applying a personal lock to prevent unexpected operation of the system. Padlock keys must be in control of the person who is conducting the job. Also apply danger tags.
- Verify that all the circuits are dead. A tester shall be used to verify that all conductors are dead. Also remember to test the tester before real testing.
- Conduct temporary grounding if required based on the system's voltage level.

Live working

- Whenever work is to be carried out on or near exposed energized conductors, live working practices have to be followed, including the use of special tools and personal protection (insulated shoes, protective clothing, etc.).
- Any conductors or parts of electrical equipment that have not been properly locked and tagged out must be treated as being energized.



Working with hydraulic systems

- Beware of uncontrolled movement of parts due to stored high pressure.
- Beware of high pressure fluid jets due to leakages or the unintentional opening of non-depressurized valves/cocks.
- Never begin work on a hydraulic system until you are properly trained.
- Review all Material Safety Data Sheets (MSDS) for all chemicals used.
- Carefully review the manuals on equipment before beginning work. Ask questions about anything you do not fully understand.
- Maintain a clean work area free of slipping hazards and debris.
- Block, secure or lower to the ground components that may move, rotate or fall.
- Use test equipment designed for higher pressures than the system being operated. The use of gauges, lines, connectors, etc., designed for lower pressures can result in bursting or

equipment damage. Start with high pressure gauges and work down (a good rule is to use equipment rated at twice that expected).

- Use all required safety equipment.
- Do not use fingers or hands to find leaks.
- Always use safety glasses and/or face shield/full face protection.
- Do not work beneath equipment/apparatus being supported by hydraulics. Stops, safety pins, etc., must be in place before repairs begin.



- Use arm protection to avoid small cuts, slashes and burns.
- Use extreme caution when disconnecting hydraulic lines. Hot fluids can cause severe burns.
- Clean up spills immediately. Hydraulic fluid can cause slips, falls and result in injuries.
- Avoid heating activity near pressurised fluid lines.

Whenever operating at the site with non Wärtsilä supplied hydraulic tools of doubtful maintenance conditions, use a flexible protection hose over the high pressure hydraulic hoses to prevent any cuts from breaking hoses.

Length change

When a hose installation is straight, allow enough slack in the hose line to provide for length changes that will occur when pressure is applied.





Movement/Flexing

An adequate hose length is necessary to distribute movement on flexing applications and to avoid abrasion.



Tight bends

1. When the radius is below the required minimum, use an angle adapter to avoid sharp bends.



2. Use a proper angle adapter to avoid tight bends in the hose.



Twisting

Prevent twisting and distortion by bending the hose in the same plane as the motion of

the port to which the hose is connected.

Strain

Elbows and adapters should be used to relieve strain on the assembly, and to provide neater installations. These will make it more accessible for inspection and maintenance.



Abrasion

Run the hose in the installation so that it avoids rubbing and abrasion.

Collapse

To avoid hose collapse and flow restriction, keep the hose bend radius as large as possible. Refer to the hose specification tables for the minimum bend radius.



High heat

High ambient temperatures shorten hose life, so make sure the hose is kept away from hot parts. If this is not possible, insulate the hose with protective sleeving.

Pneumatics

When dealing with pneumatic components keep these points in mind:

- Always wear safety glasses.
- Compressed air should never be directed towards or applied to any part of the human body. Never direct a compressed air stream towards your own or anyone else's face.
- Vent and depressurize all circuits and components when you are finished using them.
- Never place yourself, another person or any part of a person in the line of action of a pneumatic actuator, or system component. This means that you never point moving parts toward anyone, ever.
- When activating a pneumatic system, be certain that you have examined all the components, and that you have evaluated what will happen when the system is energized.
- Check and secure all of the mountings, fittings, piping, tubing, connectors and connections before connecting any pneumatic components or systems to a compressed air supply.



- Never heat the pressure storage tank.
- Always use a regulator and pressure gauges in your system to monitor system conditions.
- Never over-pressurize cylinders, storage tanks, directional valves or other system components.
- Never exceed the pressure rating of a pneumatic component.

Welding and flame cutting

Make sure that you have the permission of your superior/customer, including the necessary permits such as hot work permits to carry out this operation.

Welding and flame cutting can cause injuries such as burns, damaged eyesight and suffocation. The main danger is fire, often caused when nearby materials catch fire or when gases leaking from the hoses catch fire. Other dangers include exposure to intense ultraviolet (UV) light, hot particles of molten metal being released, and “flashback” which occurs when the flame goes back through the blow pipe into the hoses and regulators.



By following the safety checklists and steps below, the risks associated with welding can be controlled.

Equipment

- Gas cylinders should be kept secure, upright and outside the confined space.
- The hose length should be kept as short as possible.
- Flame (flashback) arrestors reduce the risk of flash backs and help protect cylinders from the effects of fire by cutting off the gas supply.
- Non-return valves and pressure content gauges should be fitted to equipment as appropriate.
- Hoses should not be joined. However, when joining is necessary, approved hose couplers and crimped fittings must be used.

Maintenance

- Cylinder valves should be kept free from oil, grease and dirt.
- All equipment should be checked for damage daily or before use.
- Use soapy water when testing for leaks. Leaks should be reported immediately.
- Damaged equipment must not be used until it is repaired or replaced.

Storage

- When cylinders are not being used store them:
 - Upright and secure in a well-ventilated area.
 - On a well drained surface to prevent corrosion.
 - Away from risk, the workplace, and any source of heat.
- Different gases should be stored separately from each other.
- Oxygen should be stored at least 3 meters from fuel gas cylinders.
- Filled cylinder tanks should be stored separately from empty ones.

Operating areas

- Welding should be done in well ventilated areas to prevent the build up of fumes.
- Portable ventilators/extractors can be use to extract fumes and dust if the ventilation is limited or the work area is confined.
- Suitable fire extinguishers should be closely provided to the welding work area.
- All combustible materials must be removed from the area. If this is not possible, they should be protected by non-combustible screens.

Equipment use

- Only fully trained or welding certified personnel are allowed to use and maintain equipment.
- Welders/operators should wear suitable personal protective equipment.
- Follow the manufacturer's procedures for ignition.

Arc welding

- Electrical cords, associated fittings and electrode holders must be properly insulated for outdoor use.
- All electrical circuits should be fitted with an over current device.
- Work pieces should be grounded unless a double insulated transformer is being used, in which case the transformer casing should be earthed and not the work piece.



Workshop machine tools

- You should receive proper training on how to safely operate the machine before using it. Each machine has its own characteristics and presents specific hazards that you must know before you operate it.
- You must wear personal protective equipment before you operate the machine.
- Locate the nearest first aid kit, eye wash station, and safety shower to your workstation. Locate the nearest emergency exit route from your workstation.
- Do not wear ties, loose clothing, jewellery, gloves, etc., around operating machinery. Long hair must be tied back or covered to keep it away from moving machinery. Hand protection in the form of suitable gloves should be used for handling hot objects, glass or sharp-edged items.
- You must first inspect the condition of the machine before it is started. Check for the proper setting of the guards, locate the emergency stop button, check the state of the electrical cord, make sure the danger zone is not accessible, verify that the machine is stable, and that it will not move or tilt over when in operation.
- Report immediately if a machine is defective or if a safety device is missing or damaged: DO NOT operate the machine.
- Make sure the work station is clean and that the working environment will remain safe and free of dust or other residue emission after the machine is operated.
- Use a brush, hook or special tool for the removal of chips, shavings, etc., from the work area. NEVER use your hands to clean cuttings – they are sharp.
- Avoid excessive use of compressed air to blow dirt or chips from machinery to avoid scattering chips. Never use compressed air guns to clean clothing or hair, and never aim the compressed air gun at another person.
- Keep your fingers clear of the point of operation at machines by using special tools or devices such as push sticks, hooks, pliers, etc. NEVER use a rag near moving machinery.



- Never clean, apply oil or repair a machine while it is running.
- Do not overload machines.
- Clean up your work station and the machine after the work is completed.

Drilling

- Run the drill at its correct RPM for the diameter of the drill bit and the material.
- Always secure the work in a vice or clamp fixed to the drill table.
- Use the proper drill bit for the material being drilled.
- Use the proper cutting fluid for the material being drilled.
- Ease off the drilling pressure as the drill starts to break through the bottom of the material.
- Do not use a dull or cracked drill.
- Do not drill with too much pressure.
- Always try to support the part on parallels or a backing board when drilling through material.
- Never place a taper shank tool such as large diameter drills or tapered shank reamers, in a drill chuck. Only straight shank tools such as standard drills can be clamped on chucks.
- Always clean the drill shank, drill sleeve and spindle hole before mounting.

- Remove taper shank tools from the spindle or sleeve with a drill drift and hammer.
- Never try to loosen the drill chuck while the power is on.
- Lower the drill spindle close to the table when releasing the drill chuck or taper shank drill, to reduce the chance of damage should they fall onto the table.
- If a drill binds in a hole, stop the machine and turn the spindle backwards by hand to release the bit.
- When drilling a deep hole, withdraw the drill bit frequently to clear chips and lubricate the bit.
- Always remove the drill chuck key or the drill drift from the spindle immediately after using it.
- After turning the power off, let the spindle stop on its own accord. Never try to stop the spindle with your hand.



Turning

- Make sure that the chuck and driveplate or faceplate are securely tightened onto the lathe spindle.
- When installing and removing the chuck, driveplate or faceplate, do not use machine power.
- Move the tool bit at a safe distance from the collet or chuck when inserting or removing the work.
- Do not run the machine faster than the proper cutting speed – consult a speed and feed table to determine the best speed.
- Always clamp the tool bit as short as possible in the tool holder to prevent it from breaking or chattering.
- Always make sure that the tool bit is sharp and has the proper clearance.

- If work is turned between centres, make sure that proper adjustment is made between centres and that the tailstock is locked in place.
- If work is being turned in between centres and expands due to heat generated from the cutting, readjust the centres to avoid excessive friction.
- Do not grasp or touch chips or turnings with your fingers. Get rid of the chips and turnings using a blunt instrument. Be sure to turn off the lathe before clearing chips.
- Do not cut work completely through when turning between centres.
- Remove the chuck key from the chuck immediately after use.
- Turn the chuck or faceplate through by hand before turning on the power, to make sure there is no binding or clearance problem.
- Stop the machine before taking measurements.
- Before cleaning the lathe, remove tools from the tool post and tail stock.

Milling

- The work must be clamped securely in a vice and the vice clamped tightly to the table, or the work must be clamped securely to the table.
- Make sure the cutter is rotating in the proper direction before cutting your material.
- Before running the machine, the spindle should be rotated by hand to make sure it is clear for cutting.
- Make sure the power is off before changing tools.
- Always use the correct cutting fluid for the material being cut.
- Never run the machine faster than the correct cutting speed.
- Make sure the machine is fully stopped before taking any measurements.
- Always use tools that are sharp and in good condition.
- Do not place anything on the milling machine table, such as wrenches, hammers or tools.



- Always stay at the machine while it is running.
- Don't take too heavy a cut or use too rapid a feed.
- Remove the collet tightening wrench immediately after using it.
- Install a guard or shield to prevent chips from hitting other people.
- Use the milling machine spindle brake to stop the spindle after the power has been turned off.
- Before cleaning the mill, remove cutting tools from the spindle to avoid cutting yourself.

Grinding

- Abrasive wheel machinery must only be operated with appropriate guards in place.
- Never use a wheel that has been dropped or that has received a heavy blow, even though there may be no apparent damage. Such wheels may be weakened or unbalanced enough to fly apart on start-up.
- Stand to one side when starting a grinding machine. Damaged wheels will sometimes fly apart, and this is most likely to happen when the machine is being started. Stand to the side so that you will not be in-line with the debris.
- Do not grind on the side of the wheel unless wheel is specifically designed for such use.

- Do not use excessive pressure while grinding.
- Make sure that the object you want to grind is in fixed position and secured. Use the grinder with both hands. Use the tool rest to support the work when off-hand grinding on a bench or pedestal grinders.
- Wear a safety face shield over safety glasses when grinding.
- Neither compressed air nor oxygen is to be used to dust down your clothing.

Chromium plating

Chromium solution is highly toxic and corrosive and therefore special care has to be taken whenever working in a Chromium Plating Workshop. When working in the chrome plating department, the following additional Personal Protective Equipment (PPE) must be worn:

- Protective glasses and acid resistant gloves.
- Respirator when exposed to chromium fumes.
- Acid resistant overalls – whenever entering an empty chromium tank for cleaning or maintenance. Chromium plating solution must not come in contact with skin, as it is easily absorbed.

In the event that the chromium comes in contact with the skin, it must be rinsed using an abundance of fresh water. When working close to the chromium plating tanks, also wear a suitable protective mask. Chromium solution vapours must not be inhaled. Chromium solution must not be swallowed. Pay great attention and work slowly whenever you are putting parts to be chromium plated inside the tanks in order to avoid splash/jets. Always keep the floor and tools clean and free from chromium plating solution.



Foundry

Risks:

- Hot metal (splash, spill).
- Moisture in scrap material.
- Heat Radiation in the mould and scrap material.
- Falling into the ladle or oven.
- Explosion of the melting bath due to water moisture pollution.
- Chemicals in eyes.
- Dust (silica, fine dust).
- Reduce the amount of employees in the area like visitors. Border the area.
- Safety glasses
- Use respirators for fine dust (Silica): P3.
- Cabins on mobile equipment should have an over pressured atmosphere that reduces the exposure to dust for the driver.
- Hearing protection.

When working in the foundry, please utilize the following measures wherever and whenever necessary:

- Heat insulated clothing
- High model safety boots
- Helmet
- Gloves
- Face shield
- Mark the working area as a high risk area: no entrance for unauthorized people.



Emergencies

All employees are responsible for safety in Wärtsilä. At the work site, make sure you know beforehand who is/are skilled in first aid procedures.

Injuries

What to do during emergencies:

- Assess the situation – do not put yourself in danger.
- Make the area safe.
- Assess each victim and attend to any unconscious victim first.
- Send for help immediately – do not delay.

Call for emergency help if needed and:

- Report what happened.
- Report where it happened.
- Report any eventual potential danger to other people.
- Keep calm and answer all the questions.
- Don't hang up before given permission to do so.
- Remember to direct the first aid personnel to the place of accident.
- If the injured person's condition changes drastically, re-call the emergency centre.
- Warn others and prevent any further accidents.
- If you suspect the injured person has a spinal or neck fracture, don't attempt to move him or her unless absolutely necessary in order to ensure breathing, or for your own safety.
- Move the injured person to the closest safe place.
- Warn others and isolate the area, if necessary.
- Make sure the injured person is breathing and that his heart is beating.



- Open the injured person's airways by tilting the injured person's head back and lifting his or her chin.

- Check for breathing by feeling for breath on the back of your hand. Check for air flow and listen for sounds of breathing.

- Turn a breathing but unconscious injured person to a recovery position.

- If the injured person isn't breathing, start Cardio Pulmonary Resuscitation with 30 chest compressions. Open the airways and give two rescue breaths (mouth to-mouth resuscitation). Continue alternating rescue breathing with chest compressions (2 breaths, 30 chest compressions).

- Stop severe bleeding by applying pressure to the wound.

- Continue to give first aid procedures until help arrives. Give any other necessary first aid.

- Arrange to meet the helpers and direct them to the site of the accident. Tell the helpers what has happened and what has already been done.

- Do not leave the injured person alone and without monitoring.

- Inform your superior as to what happened.



Eye injuries

Foreign bodies in the eye:

- Do not rub or touch the eye.

- Flush the eye and flutter the eyelids at the same time.

- Have your eye checked at the medical room if you suspect you may have a foreign body in your eye. A metal shaving in your eye may cause a "rust ring" if not removed in time.

A burn in the eye:

- Cool the eye under running cold water.
- Get medical care. Call a doctor.

Chemical splash in the eye:

- Flush the eye(s) with water immediately for at least 15 minutes.
- Call a doctor even if the pain (irritation) disappears after flushing.
- Tell the medical personnel the name of the chemical. If possible, give the medical personnel the Material Safety Data Sheet or the label of the chemical substance.

Bruises, strains and sprains

Apply these principles:

- Apply a cold compress, a bag of ice cubes or anything else applicable, to the injured area to minimize swelling and bleeding. Don't use a cold compress for longer than 30 minutes at a time.
- You may continue the treatment every one or two hours for one or two days.

Cuts and wounds

- Stop the bleeding by applying pressure to the wound.
- If there is severe bleeding, first lay the person down.
- Apply a pressure bandage to the wound.
- A good pressure bandage is a cold compress. This will also help to reduce the bleeding. Double check if the cold bandage could be in touch with bare skin.
- If you use a pressure bandage, first place a sterile pad to the wound, for example a roll of gauze or a splint, and then apply the bandage snugly.
- Locate the closest place where you can find first aid supplies.

Everyone has a right to receive first aid treatment and everyone has an obligation to give it to the best of their ability, according to one's knowledge and skills.

Fire emergency

When you arrive at your work place, get familiar with:

- Fire escape plan – Get to know the location of all exits.
- Fire alarm call points – Familiarize yourself with the location of the fire alarm call points on your floor.
- Fire extinguishers/fire hose reels – know where these are located. Knowledge of how to operate them is an asset.

Types of fire extinguisher

Dry chemical extinguisher is usually rated for multiple purpose use. It's compatible for extinguishing ordinary combustibles, flammable liquids and gases, and electrical equipment. They contain an extinguishing agent and use a compressed, non flammable gas as a propellant.

Halon extinguishers utilize a gas that interrupts the chemical reaction that takes place when fuels burn. These types of extinguishers are often used to protect valuable electrical equipment, since they leave no residue to clean up. Halon extinguishers have a limited range, usually 1.0 to 2.0 meters (4 to 6 feet). The initial application of Halon should be made to the base of the fire, even after the flames have been extinguished.

Water: These extinguishers contain water and compressed gas, and should only be used on ordinary combustibles, like wood, paper and plastics.

Carbon dioxide (CO₂) extinguishers are most effective on flammable liquid and electrical fires. Since the gas disperses quickly, these extinguishers are only effective from 0.9 to 2.5 meters (3 to 8 feet). The carbon dioxide is stored as a compressed liquid in the extinguisher; and as it expands it cools the surrounding air. The cooling will often cause ice to form around the "horn" where the gas is expelled from the extinguisher. Since the fire could re-ignite, continue to apply the agent even after the fire appears to be out.



Foam extinguisher is used for fire suppression. It's role is to cool the fire and to coat the burning fuel, preventing it's contact with oxygen, resulting in suppression of the combustion. Foam extinguishers are used in flammable liquid fires. It can be also used to prevent the ignition of the liquid, like during hot work operations.

How to use the fire extinguisher

P A S S - Pull, Aim, Squeeze, and Sweep

Pull the pin at the top of the extinguisher that keeps the handle from being accidentally pressed.

Aim the nozzle towards the base of the fire.

Stand approximately 2.5 meters (8 feet) away from the fire and **Squeeze** the handle to discharge the extinguisher. If you release the handle, the discharge will stop.

Sweep the nozzle back and forth at the base of the fire. After the fire appears to be out, continue to watch it carefully since it may re-ignite!

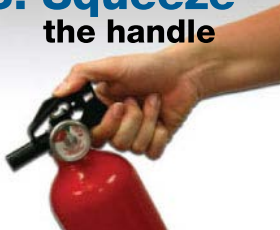
1. Pull the pin



2. Aim at the base of the fire



3. Squeeze the handle



4. Sweep from side to side



If you discover a fire:

- **Raise the alarm** – if you detect any fire or smoke, break the glass of the nearest fire alarm call point, activate it, and alert the area supervisor.
- **If possible, attack the fire** – use the nearest fire extinguisher or fire hose reel to put out the fire. However, do not put yourself at risk.
- **Evacuate** – know where the emergency exits are located.

If you hear the fire alarm:

- Evacuate via the nearest exit immediately. If you hear any announcement over the public address system, follow all instructions calmly – DO NOT PANIC.
- Do not attempt to pack belongings – Time is precious. Do not attempt to pack your things, save your life first.
- Do not use elevators – Never attempt to use elevators to evacuate. Use the exit staircase instead.
- Inform someone of your presence.
- If you detect smoke in the exit way, do not enter. Choose another exit way.
- Keep the smoke/fire out – wet towels or sheets and wedge them under the door to prevent smoke from entering the room.
- If you are caught in smoke, take short breaths and crawl to escape, because air nearer the floor is cleaner and less likely to contain deadly gases.
- When you get out of the building, go to the assembly area, and report to the helpers.

Travel safety, security and medical care

Preparing to travel

- Book all travel via Wärtsilä selected Travel Agency, Wärtsilä self-booking and hotel booking tool
- Ensure that your contact information in Wärtsilä's HR system is correct enabling us to contact you in case of emergency
- Install the **Anvil App** which is available on App Store and Google Play, activation code: WCO
- Study the country information and check expected local risks: <https://wartsila.anvilgroup.com/>
- Get the necessary vaccinations and pack necessary medication & first aid kit for the trip
- If you need up-to-date information about the destination contact Anvil Assistance

MyTravelSecurity

Travel Security & Medical Services
IN CASE OF EMERGENCY 24/7/365
Save this number on your **phone** and
also **write it down** on paper before travelling!

+44 (0)20 3859 4494
wartsilatravelsupport@anvilgroup.com

Road safety

Travelling on the road is one of the highest safety risks in Wärtsilä operations. When you plan your travel, first consider if you need to drive at all, or if you can use professional taxi services. Please complete the **“road safety check list”** in the **MyTravel** when filling the travel request, and always follow our life-saving rules:



**Wear your
seat belt**



**Comply with
road safety rules**

Wärtsilä is a global leader in smart technologies and complete lifecycle solutions for the marine and energy markets. By emphasising sustainable innovation, total efficiency and data analytics, Wärtsilä maximises the environmental and economic performance of the vessels and power plants of its customers.

www.wartsila.com