

Safety Booklet for On-Site Generators

Foreword

For Atlas Copco safety always comes first. Our commitment to the safety, health and well-being of our customers and employees comes without compromise.

This dedication is translated into actions throughout the three pillars of safety: the way we work, the equipment we build and how it operates on site.

This safety booklet is specifically written for you and every other single user of Atlas Copco on-site generators. It supplements the specific information on your machine contained in the Atlas Copco Instruction manual and presents a refreshing view on safe working habits.

This booklet highlights the most important guidelines that lead to safe operation. It also points out the most common hazardous situations that can occur and explains how these conditions can be avoided.

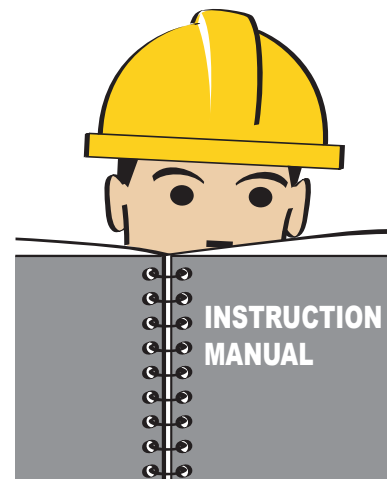
By presenting a well-worked safety program that offers useful information and practical advice, we want to attain safer and healthier working conditions for all users of our products.



1 Safe working habits

1.1 Learn to be safe

- Attentively READ THE INSTRUCTION MANUAL and other information that comes with your on-site generator. Be sure to truly understand the information received.
- Get to know your machine: what are its operating and maintenance characteristics, what are its capacities and limitations.
- Get to know the location and functionality of ALL the controllers, indicators and instruments provided on your machine.
- Get to know ALL warning and safety devices your machine is equipped with. Check that each of them is in place and in good operating condition. Do not put them out of action!
- DO NOT MODIFY THE SETUP OR DESIGN of your generator in any way. They are well-considered and have been developed in view of your safety.
- Learn to recognize the machine's warning and safety signals. They alert you to hazardous situations. Do not only acknowledge these alarms, but also react adequately.
- Carefully read and follow all safety signs and instructions mentioned on the machine. Keep them in good shape and replace missing or damaged ones.
- Perform good maintenance.



1.2 Adopt a sensible attitude

Human error can have many different causes: being tired, absentminded, having too much on ones mind, negligence, drugs, alcohol,...

Damage to a machine can be easily repaired, but injury (or death) has a permanent effect.

For your safety and the safety of others, work safely and encourage your fellow workers to act the same. Know that by neglecting safety precautions you may endanger people as well as environment and machinery.

1.3 Be pro-active

Take benefit from the Atlas Copco training programs you are offered. They have been developed to broaden your knowledge of the unit you operate and the equipment to use.

A better knowledge of your generator will automatically reduce the risk on unsafe working conditions.

1.4 Form good dress habits

Do not wear the hair long and loose (protect long hair with a hairnet), or wear loose clothing or jewelry that can catch in rotating parts.

Make sure your pockets are free of any objects that could fall out - and into your generator.

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Depending on the job you are doing (some of) the following personal safety gear may be required:

- Safety glasses
- Ear protection
- Safety helmet (including visor)
- Safety gloves
- Protective clothing
- Safety shoes
- Respirator



BUT, keep in mind that when wearing safety gear, you might be less aware of your environment.

1.5 Aim for a safe work area

Keep the work area neat. Lack of order will increase the risk of accidents. Your generator and used equipment shall be kept clean. Remove oil, dust or other deposits.

Find out where to get assistance and how to use a first aid kit and fire extinguisher.



1.6 Check your generator daily

Perform a daily visual walk around the unit.

If your daily check reveals any item that needs repair, replacement or adjustment, act immediately.

The smallest malfunction could be the result of a more serious trouble or could cause this if your unit continues to operate.

2 Safe transport and installation

2.1 Checks prior to towing

Inspect tires

Check that the wheels are secure and that the tires are in good condition and inflated correctly. Ensure that they are not misaligned or out-of-balance.



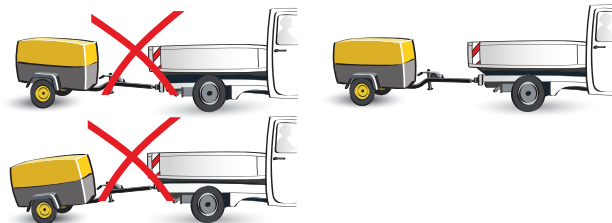
Make sure all wheel bolts, lugs, and nuts are tightened to Atlas Copco instructions.

Do not change tire sizes or types.

Check compatibility

Make sure the towing vehicle is compatible to the unit to be towed:

- Check the type and condition of the towing eye: the towing hitch and towing connections (towing eye/ball coupling) should be compatible and in good shape.
- Check the tow bar height.



- Check all electrical and other connections: all connections should be compatible.
- To tow a unit, use a towing vehicle of ample capacity. (Refer to the documentation of the towing vehicle.) Check the towing and brake capability of the towing vehicle.

Ready for the road?

Make sure your unit fulfils all local legislation.

Check your unit's speed and design limitations (e.g. undercarriage for on-road or off-road use).

Check the unit's tow bar, brake system, chains and road signalisation, if provided. Also check the coupling of the towing vehicle (no excessive wear or corrosion, deformed components, loose nuts/bolts/...).

2.2 Towing or lifting

Switch off the battery

If installed, turn the battery switch into the "OFF" position before towing, lifting or transporting the generator in any way. If no battery switch is installed, disconnect the battery cable (-).

Preparing to tow/lift

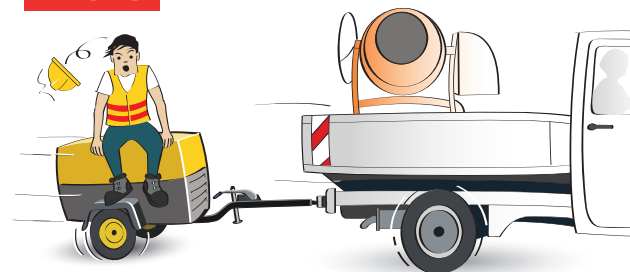


- If already in use, stop the unit and loosen all connections and power cables.
- Make sure all service panels and doors are shut. Secure all loose or pivoting parts.
- Use a lifting device (e.g. jack) if you can not lift or lower your unit's tow bar without endangering yourself or fellow workers.
- Make sure the jockey wheel and/or support legs are safely locked in the raised position.
- Keep hands/fingers away from the coupling device and all other potential pinch points. Keep feet away from the tow bar to avoid injury if it should slip.
- Make sure there are no objects on the unit.
- Make sure there are no obstructions behind, in front of, and under the unit before moving it in any direction.

Towing

- Make sure no one is in the way, before backing the towing vehicle and position it in front of the unit.
- Never allow anyone to stand or walk between the generator and the towing vehicle.
- Make sure the coupling device is fully engaged, closed, and locked.
- Attach the safety break-away cable or safety chain to the towing vehicle.
- Connect the signalisation cable, check all lights and connect the pneumatic brake couplers (if provided).
- If provided, connect the overrun break cable to the towing vehicle (small units).
- If other electrical connections are provided, attach them according to Atlas Copco instructions.
- If the unit is to be backed up by the towing vehicle, disengage the overrun brake mechanism (if it is not an automatic mechanism).
- Never allow anyone to ride in or on the generator or tow bar.

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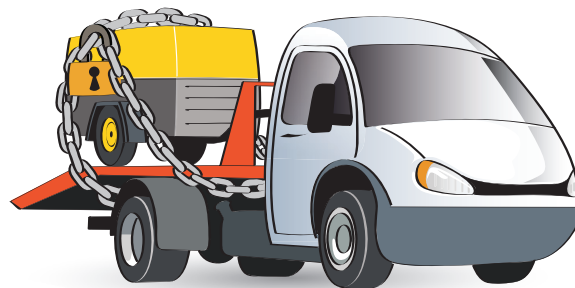
- Observe all local and federal traffic laws. Do not exceed legal speeds or maximum towing speeds recommended by Atlas Copco.
- Adjust the towing speed to road conditions and consider increased stopping distances.
- Avoid unstable ground, potholes, rocks and other obstructions.
- Manoeuvre carefully, especially when moving backwards.

Lifting

- Always use the lifting eye/beam/... the unit has been equipped with.
- Use appropriate hook and tools.
- Do not attach cables, chains or ropes directly to the lifting eye; apply a crane hook or lifting shackle meeting local safety regulations. Never allow sharp bends in lifting cables, chains or ropes.
- Helicopter lifting is not allowed.
- It is strictly forbidden to dwell or stay in the risk zone under a lifted load. Never lift the unit over people or residential areas.
- Lifting acceleration and retardation shall be kept within safe limits.
- Never leave a load hanging on a hoist.

2.3 Loading and unloading

- Keep all non-essential personnel away from the loading area.
- Load and unload on a level surface.
- Block the transport vehicle.
- If ramps are used, use ramps of adequate size and strength, low angle, and proper height.
- When lifting the unit, be certain the hoist and/or lifting devices have adequate capacity.
- Make sure the unit is securely fixed to the transport vehicle (e.g. by using the forklift slots and tie down bolts) and ensure a good balance.
- Check height, width and weight for travel clearances and load limitations.

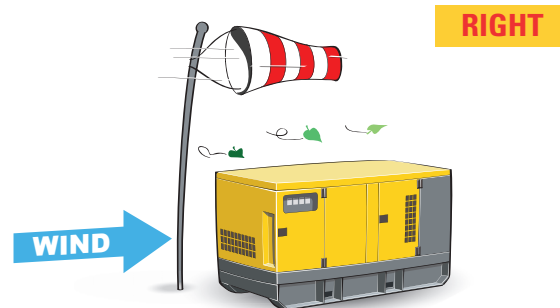


2.4 Location and parking

- Park or locate your generator on firm, level ground. However, it can be operated temporarily in an out-of-level position not exceeding 15°.
- If the generator is parked on sloping ground, immobilize it by placing wheel chocks in front of or behind the wheels or park the unit across grade, so it does not tend to roll downhill. On four-wheel machines, always park with the front wheels in straight-ahead position.



- Locate the rear end of the generator upwind, away from contaminated wind-streams and walls. Avoid recirculation of exhaust air from the engine. This causes overheating and engine power decrease.



- Never use the unit indoors or under a roof. Exhaust gasses are lethal.
- If provided, apply parking brakes and disconnect the safety break-away cable or safety chains and all other electrical connections and/or brake cables.
- Unhook chains.
- Lower jockey wheel and/or support legs. Make sure they are securely locked in the down position.
- Unhook the tow bar from the towing vehicle, beware of potential pinch points.
- Move the towing vehicle away from the parked generator.
- Provide earthing to your generator. This must be done either by means of the earthing rod or, if available, an existing, suitable earthing installation. Install the earthing rod correctly. Check that the cable end of the earthing rod is connected to the earth terminal.
- Be careful when raising a lighting tower. Make sure no obstacles can interfere when raising the mast (e.g. high voltage lines, constructions, ...).

3 Safe operating conditions

3.1 Walk-around inspection

Before you start each day, walk around the generator and inspect for leaks, loose or missing parts, damaged parts, or parts out of adjustment. Perform all recommended daily maintenance.

No machine should be operated if any part is not in proper operating condition.

3.2 Check fuel/oil/water level

With the generator standing level, check the oil, fuel and water level of your unit, before starting. Top up, if necessary.

ONLY REFILL FUEL/OIL/WATER WHEN THE UNIT HAS STOPPED AND ELECTRICAL POWER IS SWITCHED OFF!

Safely refill oil

Use only lubricating oils and greases recommended or approved by Atlas Copco or the machine manufacturer. Ascertain that the selected lubricants comply with all applicable safety regulations, especially with regard to explosion or fire-risk and the possibility of decomposition or generation of hazardous gases.

Never mix synthetic with mineral oil.

Safely refill fuel

Keep fuel away from hot parts such as air outlet pipes or the engine exhaust.

Do not smoke, use open fire or use electronic devices when fuelling.



Before fuelling, touch the canopy to discharge static electricity. When fuelling from an automatic pump an earthing cable should be connected to the unit to discharge static electricity.

Safely refill coolant

Never remove a filler cap of the cooling water system of a hot engine. Wait until the engine has sufficiently cooled down before removing the radiator cap.

Maintain the cooling system according to the Atlas Copco instructions. Hot coolant can spray out and you can be burned if you improperly maintain or service the cooling system.

3.3 Pre-start procedures

- Before initial start-up, prepare the battery for operation if not already done.
- Press vacuator valves of the air filters to remove dust.
- Make sure all cables and applications to be connected to the generator are in good shape, well-maintained and suitable for your type of generator.
- Make sure all generator cables are in good shape.
- Make sure all cables and other connections are well-fixed and secured according to Atlas Copco instructions.
- Verify the earthing of the generator at each start-up and at any time a new load is connected.
- When working in extreme weather / temperature conditions, make sure your generator is equipped with the correct options and that matching lubricants / fluids are used.
- Close all service doors / panels before starting the generator.



3.4 Bring fellow workers to safety

Warn anyone near the generator before (remote) starting.

Make sure everyone nearby is wearing appropriate personal safety gear.

3.5 Starting the engine

Before starting the engine, be sure to know your generator's emergency shutdown procedure and get familiar with all warning devices, alarms, gauges and operating controls.

Know the correct starting procedure for your generator. Refer to the Atlas Copco Instruction manual.

Do not remote start the unit without being sure it is in the right conditions to do so.

3.6 After starting the engine

Keep an eye on gauges, instruments, alarms and warning lights to make sure they are well-functioning and their readings are within the normal operating range. Use a voltmeter to check the voltage.

Pressure and temperature gauges shall be checked regularly with regard to their accuracy. They shall be replaced whenever outside acceptable tolerances.

When single-phase loads are connected to the generator output terminals, keep all loads well-balanced. If circuit breakers are activated during operation, switch off the load and stop the generator. Check and, if necessary, decrease the load.

3.7 Safe working procedures during use and operation

Keep doors shut during operation

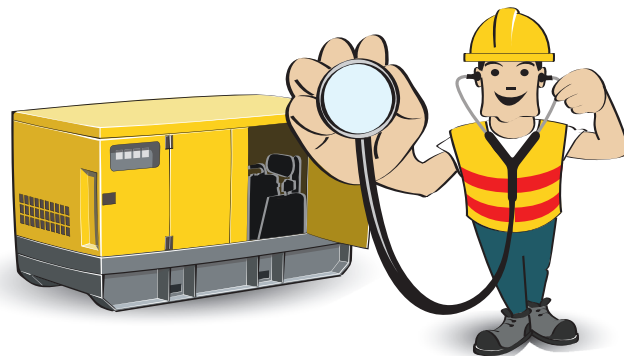
- All doors shall be shut during operation so as not to disturb the cooling air flow inside the bodywork and/or render the silencing less effective. A door should be kept open for a short period only e.g. for inspection or adjustment.
- Make sure that service doors and panels are securely fastened to prevent them from tumbling down.

Use your generator properly

- Only use the generator for the purposes it has been designed for.
- Never operate the generator in excess of the limitations mentioned in the Technical Specifications.
- Never put loose or inappropriate tools, equipment or supplies on or in your generator. A generator should NOT be used for storing materials!

Listen for trouble

- While operating the generator listen for any suspicious noises and check for any unusual vibration which could indicate trouble.



- Disconnect the battery if an unsafe condition occurs.
- NEVER NEGLECT WARNINGS / ALARMS / SHUTDOWNS.
- Stop the unit immediately when a warning / alarm occurs.
- Take the correct measurements to solve the problem causing the warning / alarm / shutdown. When continuing operation without remedying the possible cause(s) for the warning / alarm / shutdown correctly, permanent damage may be done to the unit and/or the environment.
- Contact Atlas Copco in case of any doubt.

Handle electricity safely

You can not see electricity, but when you feel it, it is too late.

Therefore, perform a good practice of electricity:

- Do not touch power cables while the engine is running.
- Never touch an electrical connector without a voltage check (use a voltmeter!).
- Make sure all connections are tightly and correctly fixed. E.g. provide only one cable for one hole or bolt, do not strip off copper from a wire to fit a hole, ...
- Avoid working on the generator when it is raining and the engine is running. Only starting / stopping the unit or using the controller is allowed under these conditions.
- Avoid having cables / sockets exposed to water and hot surfaces.
- Provide an isolating switch or circuit breaker in each load circuit.
- Changing the output frequency / voltage is only allowed after shutdown.
- Eliminating any earth fault protection can lead to serious injury or even death for anybody touching the unit or the load. Also it is strongly recommended not to change the settings (30 mA) of the earth leakage detector. They are set for your safety!
- Be extra careful when using an IT-system instead of an earthing rod. This system is by its nature less safe for the user.
- Keep in mind that when parallelling, there is still power on your terminal board even when your generator has stopped. Also notice that prior to parallelling the earth leakage relay has been disabled!
- Local rules concerning the setting up of low voltage power installations (below 1000 V) must be respected when connecting site distribution panels, switch gear or loads to the generator.



3.8 Avoid hazardous situations

Beware of lightning

Do not come near the generator during electrical storms; it may attract lightning.

Avoid exposure to noise

Noise, even at reasonable levels, can cause irritation and disturbance which, over a long period of time, may cause severe injuries to the nervous system of human beings.

When the sound pressure level, at any point where personnel normally has to attend, is above 70 dB(A), action should be taken. Depending on the noise level, noise-protective devices should be provided or ear protectors should be worn.



Avoid touching hot parts

- The unit has parts of which the temperature can be in excess of 80 °C (176 °F). The insulation or safety guard, protecting these parts shall not be removed.
- Whenever there is an indication or any suspicion that an internal part of a machine is overheated, the machine shall be stopped but no inspection covers shall be opened before sufficient cooling time has elapsed; this to avoid the risk of spontaneous ignition of oil vapour when air is admitted.
- When hot parts have to be handled, e.g. shrink fitting, special heat-resistant gloves shall be used and, if required, other body protection shall be applied.
- To prevent an increase in working temperature, inspect and clean heat transfer surfaces (cooler fins, intercoolers, water jackets, etc.) regularly.

Avoid fire hazards

Take precautions against fire:

- Handle fuel, oil and anti-freeze with care as they are inflammable substances. Always stop the engine and allow the generator to cool down before refilling. Do not smoke, approach with open flame or use electronic devices when handling these substances. Never overfill fuel tanks or fluid reservoirs. Always keep a fire-extinguisher in the vicinity.
- Remove all waste and oily rags or other flammable material from the unit.
- Check for fuel, oil and coolant fluid leaks. Replace worn or damaged hoses and lines. Repair them and clean the unit before you operate it.
- Replace electrical wiring with worn or damaged insulation.
- When the unit has to operate in a fire-hazardous environment, the unit should be appropriately equipped to work under these conditions.

- When performing any operation involving heat, flames or sparks on a machine, the surrounding components shall first be screened with non-flammable material.
- Never use a light source with open flame for inspecting the interior of a machine.
- Never weld on or perform any operation involving heat inside the unit. Never weld in or in the neighborhood of the unit.
- Always use a safe, non-flammable solvent when cleaning generator parts.
- Store all flammable liquids and materials away from your work area.
- Find out where to find fire extinguishers and how to use them. Make sure that fire extinguishing systems and fire detectors (if provided) are ready for use.

Avoid breathing exhaust fumes

- Never operate the unit in surroundings where there is a possibility of taking in flammable or toxic fumes.
- If the working process produces fumes, dust or vibration hazards, etc., take the necessary steps to eliminate the risk of personnel injury.
- If there is a risk of inhaling hazardous gases, fumes or dust, the respiratory organs must be protected and depending on the nature of the hazard, so must the eyes and skin.

- Never breathe the engine exhaust discharged from the generator. It contains carbon monoxide which is a lethal gas. When the unit is used in a confined space, conduct the engine exhaust to the outside atmosphere by a pipe of sufficient diameter; do this in such a way that no extra back pressure is created for the engine. If necessary, install an extractor. Observe any existing local regulations.

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- Remember that where there is visible dust, the finer invisible particles will almost certainly be present too. The fact that no dust can be seen is not a reliable indication that dangerous, invisible dust is not present in the air.

Handle batteries with care

- Battery electrolyte is poisonous. It is a sulphuric acid solution which is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes. Always wear eye and face protection. Flush any contacted area with water immediately.
- Use a flashlight to check battery electrolyte level. Always check with engine stopped.
- When batteries are being charged, an explosive gas mixture forms in the cells and might escape through the vent holes in the plugs. Thus an explosive atmosphere may form around the battery if ventilation is poor, and can remain in and around the battery for several hours after it has been charged. Therefore:
 - Never smoke near batteries being, or having recently been, charged. Keep away open flame or sparks.
 - Never break live circuits at battery terminals, because a spark usually occurs.
 - Follow the Atlas Copco instructions when servicing the batteries, when using jumper cables, when connecting an auxiliary battery or when using a battery charger.



3.9 Shut down safely

Follow the correct shutdown procedure as described in the Instruction manual.

These are the basic actions to perform:

- Never perform an emergency stop if not necessary. Allow the machine to cool down at idle speed.
- Switch off the load before stopping the generator.
- Disable all electrical circuits when not using your generator. E.g. switch "OFF" the battery switch, fuses, ...
- Make sure the unit is locked properly and remove the ignition key (if provided) when leaving the working area.

4 Perform maintenance safely

4.1 Good housekeeping

ALWAYS KEEP YOUR UNIT CLEAN. Always pursue a CLEAN AND DRY working area.



Wet and oily surfaces are dangerously slippery. Oily rags are a fire hazard. Avoid having cables and other electrical equipment exposed to water or hot surfaces.

Protect the engine, alternator, air intake filter, electrical and regulating components, etc., to prevent moisture ingress, e.g. when steam cleaning.

4.2 Use the correct tools

Use only the correct tools for maintenance and repair work, and only tools which are in good condition and well-maintained. With the knowledge of correct tool use and knowing the limitations of tools, along with some common sense, many accidents can be prevented.

Special service tools are available for specific jobs and should be used when recommended. The use of these tools will allow safe working conditions, save time and prevent damage to parts.

4.3 Handle heavy parts carefully

Handle tools and heavy parts with appropriate care. Lower items gently, do not throw or drop them.

4.4 Maintenance procedures

Perform maintenance adequately

- Periodically carry out maintenance according to the maintenance schedule.



- Maintenance, overhaul and repair work shall only be carried out by adequately trained personnel; if required, under supervision of someone qualified for the job.

- All maintenance work, other than routine attention, shall only be undertaken when the unit is stopped. Steps shall be taken to prevent inadvertent starting. Make sure that no electrical power is present on the terminals.
- Keep hands away from rotating parts.

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- Never use machine parts as a climbing aid.
- Support the tow bar and the axle(s) securely if working underneath the unit or when removing a wheel. Do not rely on jacks.

Work neatly

- Observe scrupulous cleanliness during maintenance and repair. Keep away dirt, cover the parts and exposed openings with a clean cloth, paper or tape.
- Never spill nor leave oil, fuel, coolant or cleansing agent in or around the unit.
- Drain properly and make sure that oil, solvents and other substances likely to pollute the environment are properly disposed of.

Replacing parts

- Replace parts only by GENUINE ATLAS COPCO REPLACEMENT PARTS.
- Before dismantling any electrical component, shut down the generator and disconnect it from any electrical system.
- When using cartridge type breathing filter equipment, ascertain that the correct type of cartridge is used and that its useful service life is not surpassed.

Finishing maintenance

Before clearing the unit for use after maintenance or overhaul, check that operating voltages, temperatures and speeds are correct and that the control and shutdown devices function correctly.

After performing maintenance make certain all guards have been installed and all safety devices are functional. Reinstall all cables / connections.

A final word to the user

Safety is a state of mind. When operating or servicing your on-site generator, do not guess, but think and be sure. Always plan ahead. Doing so, your generator will always be a source of predictable power.

Remember that you are the principal player when it comes to safety. Safe working habits do not only protect you, but also protect your fellow workers, the unit you are operating and the environment you work in.

You have read this safety booklet and studied the Atlas Copco Instruction Manual, Parts Manual and other documentation existing on your specific on-site generator. Make them a working part of your safety program.

Practice all other conventional safety precautions, and above all, remember SAFETY IS IN YOUR HANDS.





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