



# Door Removal



Advancing Professional Rescue

## ***Introduction >>>***

Rescue tools are an essential component of the modern-day Fire and Rescue Service. They allow us to rescue trapped effectively and injured casualties from a variety of situations saving vital time, and the principles can be applied to any incident where rescue equipment is used. It is supported by a series of additional modules where we talk about tool selection and different space creation techniques.

With the evolution of the motor vehicle and the introduction of advanced safety systems that include an increase in vehicle strength and the use of composite materials, the Fire and Rescue Service must continuously review their rescue equipment provision to ensure they can effectively rescue those in need of our help. For many years hydraulic rescue tools have been used to assist in the rescue process, and more recent advancements in battery technology have brought about the introduction of battery-operated tools. This has increased versatility to support the rescue process. Maintained and used correctly, these tools are safe and generally useful. However, reduced maintenance and improper use can place rescue

service personnel at risk of severe injury. So, care should be taken, and safe working practices followed when handling rescue tools, whether hydraulic, battery or hand operated.

In addition to the safe use of the tools, consideration should be given to the operators who can be placed under extreme physical and emotional burden during a rescue. So, it's essential that Incident Commander monitors tool use and the welfare of the operators, rotating personnel when necessary.

## ***Tool Selection >>>***

Rescue tools are designed for specific tasks such as lifting, spreading or cutting, some may be multi-functional such as the combination tool, which can spread and cut. When selecting a tool, operators should consider the overall objective, taking in to account the construction of the vehicle, the space available, access, time constraints, the impact on vehicle component and the needs of the casualty. These are all factors that impact on tool choice. The Incident Commander should also consider the need for additional resources and specialised equipment such as heavy lifting kit.

It is important to remember that the reason for attending an incident where persons are trapped physical or medically, is that we are there to safely release the casualty as soon as practicable, ensuring that actions taken do not adversely affect the casualty's welfare. Tool operators should always 'try before you pry' creating space by opening doors and moving seats to limit the need for rescue tool usage. It is also good practice to consider where possible a less aggressive approach and uses hand tools such as a socket set which is less impactful on the casualty, reduce the risks to personnel and can on occasion yield quicker results than hydraulic tools.

Although there is a vast range of rescue tools available on the market to suit every situation, Fire and Rescue Services must be selective due to financial and practical constraints. This may mean that on occasion operators may have to use alternative methods to achieve their goal. Under no circumstances should tools be used for a task for which they are not intended. That is unless your organisation has approved a specific

technique that has been tested in a controlled environment. An example of this is the use of a short extension ladder to stabilise a vehicle on its side. In such a case there is an agreed protocol to follow, and personnel must be trained in the given practice.

## ***Training and Maintenance >>>***

Before using rescue, equipment operators must be adequately trained by a suitably qualified instructor. The training must include equipment maintenance and cleaning, correct storage, how to connect and operate the equipment, how to change any interchangeable parts safely, the purpose and limitations of the tool, and potential hazards created by the tool's operation. It is also strongly advised that operators read the manufacturer's operating manual and, your Standard Operating Procedures before using any equipment.

The equipment must be tested under the manufacturer's recommendations. This includes an after use visual inspection and in the case of hydraulic tools, an annual inspection by a suitably trained person. Individual Fire and Rescue Services may apply new inspection regimes to fall in line with local practices. Before any inspection, ensure that all rescue equipment is stored in its allocated location and that asset management details correspond. Stowage areas should be checked to ensure that they are free from contaminants such as fuel, battery acid, glass or oils. If contaminants are present, the storage area should be cleaned to prevent damage to the equipment.

The inspecting of rescue equipment must include a full check of electric or hydraulic cables or hoses looking for cuts, heat or abrasion damage. Blades should be inspected for distortion, damage or wear, couplings should be checked for operation and cleanliness, and where applicable, protective caps must be fitted. After use rescue equipment should be cleaned and wiped down to remove any contaminants if necessary a mild detergent with clean, warm water can be used. Once cleaned and tested, equipment should be securely stored back in their allocated place and the outcome of the inspection recorded on the appropriate records.

When testing or using rescue tools, full firefighting Personal Protective Equipment should be worn, including helmet, eye protection and rescue or firefighting gloves. When using hydraulic tools, disposable surgical gloves should also be worn. If any damage or faults are found that compromise the safe use of the equipment; it should be removed from service and sent for repair or replacement.

If hydraulic tools with damaged hoses or couplings are used, there is a risk of hydraulic injection injury. A hydraulic injection can be defined as the puncturing of the skin by a jet of a fluid under pressure. Hydraulic injection injury is the term used to describe an injury sustained by an individual following an injection of fluid, usually while operating or inspecting pressurised hydraulic equipment. In the event of high-pressure fluid injection, fluid enters the body, it then begins to kill tissue with gangrene setting in if the injury is not treated promptly. There is also a risk of blood poisoning and bacterial infection.

High-Pressure fluid injection is often painless, and the point of entry through the skin is usually tiny and at the time of penetration has a dull appearance. Pain and swelling may not appear for several hours after the injection. Sometimes it may even take a few days for a reaction to appear. Although the injury may not appear serious at first, the situation can change rapidly, with tissue becoming swollen, discoloured and extremely painful with extensive subcutaneous necrosis.

A high-pressure fluid injection injury is a surgical emergency, which involves the removal of dead tissue and the cleaning of the fluid from the wound. Surgical intervention should be undertaken without delay, failure to act quickly may result in the need to amputate the active area and in an extreme situation may result in death.

The severity of the injury depends on some factors, such as the amount of injected fluid, the viscosity and pressure of the fluid, the area of the body where the injection took place and the time is taken until surgical intervention. It is important to note that high-pressure injection injuries are preventable by just following the guidance already provided.

## ***Safe Use of Rescue Tools >>>***

As already mentioned, when using rescue tools full firefighting Personal Protective Equipment must be worn. Rescue tools are ergonomically designed for single person operation; however, they are still relatively heavy, and operators should ensure correct lifting techniques are used to avoid manual handling injuries such as strains and as previously mentioned it's good practice to rotate operators to prevent fatigue. If using hydraulic or electrical tools that require a separate power supply such as a power unit or generator care must be taken not to damage the cables or hoses. Both are susceptible to damage such as cuts, abrasion, kinks, burns, or chemical contamination.

Sharp edges such as glass and metal should be covered to prevent accidental damage, and you should never stand on them as the weight applied can force foreign objects to penetrate the protective sleeves. Hose or cables should not be used to carry, pull or move the rescue tools or power unit, and care must also be taken not to drag them along the ground as both practices can cause damage. When connecting them to a power unit, make sure you always connect them to the tool and power unit before turning the power on.

For hydraulic power units that have vertical inline connections, hoses should be connected to the power unit from the bottom up. Once the hydraulic hose is connected, and the power unit is running with the tool engaged you should avoid handling the hose to reduce the likelihood of a high-pressure fluid injection injury if the hose is damaged. You must also avoid kinking the hose, not subjecting them to a bend radius of fewer than 150 millimetres, which equates to no smaller than the size of a football. If for any reason a hose or cable is damaged they should not be used and removed from service immediately.

Unless confirmed to be intrinsically safe battery or electrical tools should not be used in Flammable atmospheres, neither should power units. If for some reason you are working in enclosed spaces, power units must be placed outside the area, as there is a danger of carbon dioxide poisoning which may lead to asphyxiation.

Before using rescue tools to cut, spread or ram a full assessment of the vehicle should be completed to identify potential hazards such as additional safety systems. The area where the tool is to be used must be exposed by 'peeling and revealing' to identify any high tensile steels such as bolts and mounting brackets, as well other potential hazards such as airbag detonators and seat belt pre-tensioners.

Failure to identify these vehicle components may lead to tool damage or accidental activation of a vehicle safety system. Rescue tools are very powerful, and in the case of Cutters, Rams and Spreaders operate with an incredible amount of force. When using these tools, you should always remain in a position of safety, this is generally outside of the tool, away from the vehicle. Ensuring you are not positioned between the tool and the vehicle as there is a danger of getting trapped in the tool twists or slips.

If you are lifting or spreading part of the vehicle, you should 'pack as you jack' filling the voids created with blocks and wedges to prevent the vehicle structure returning to its original position if the tool is released or in case of an uncontrolled slippage or tool failure. When using rescue tools, you must keep your hands away from blades or between spreading tips always especially during tool activation, instead of using the designated handles. When moving around ensure any trigger locks are activated and if applicable jaws should be closed.

Tools not actively being used should be returned to the tool staging area and left in the closed position and where possible the tool should be isolated from the power source. When using rescue tools, it is imperative that protection is provided for any casualties and other emergency service responders. With soft protection being used to shield the casualty from dust particles and hard protection being used to protect the casualty and other emergency service responders from any flying debris that may result from the use of rescue tools. Hard protection should be placed as near to the component being cut or spread as possible to limit possible projectile travel.

## **Summary >>>**

- In summary, rescue tools are an essential component of the modern-day Fire and Rescue Service that significantly improves our rescue capabilities.
- Appropriately maintained and used correctly they are safe and generally useful.
- Full Personal Protective Equipment should be worn when rescue tools are in use, including when testing the equipment. Latex gloves should be worn under firefighting or rescue gloves when using the hydraulic equipment.
- Equipment should be cleaned and tested after use, and the test result should be recorded following your own organisation's protocols.
- Do not drag hoses or cables along the ground and cover sharp edges to prevent accidental damage. Avoid kinks in hoses and do not handle when under pressure.
- Assess the vehicle for potential hazards before using tools and always 'try before you pry' to prevent unnecessary tool usage, creating space by opening doors and moving seats.
- You should 'peel and reveal' to check the areas where you are cutting or spreading to prevent tool damage and accidental detonation of safety systems.
- When using rescue tools make sure you are in a position of safety, generally outside the tool to prevent you getting trapped if the tool twists.
- Always use Hard and Soft protection to protect the casualty and other emergency service responders.
- Ensure cutters and spreaders are closed while moving around the incident site and keep your hands-off blades or between spreading tips.