



# ***SAFETY MANUAL for AMKUS RESCUE SYSTEMS***

## **⚠ DANGER**

**Understand manual before use. Operating AMKUS Rescue Systems without understanding the manual, receiving proper training, and using appropriate personal protective equipment is a misuse of AMKUS equipment. Obtain safety information at [www.amkus.com/](http://www.amkus.com/)**

This Safety Manual is intended to familiarize rescue workers and maintenance personnel with the safety messages of AMKUS Rescue Systems, including powered rescue tools (rams, cutters, spreaders, combination tools), power units (electric or gasoline driven), and powered rescue tool components (cable assemblies, hose assemblies, hose reels, etc.). The safety messages in this publication supersede safety information appearing in AMKUS publications prior to April 2016.


This manual is intended for use with manuals published by manufacturers of prime movers (engines, electric motors, and pumps) used in AMKUS power units.

This manual does **NOT** address operation or servicing of AMKUS Rescue Systems. Only competent rescue tool repair technicians are qualified to repair AMKUS equipment. This manual should be available to all personnel involved with AMKUS equipment.



**AMKUS RESCUE SYSTEMS**  
MADE IN USA • [www.amkus.com](http://www.amkus.com)


4201 Montdale Drive, Valparaiso, IN 46383-4098 USA  
800-592-6587 • 630-515-1800 • Fax 219-476-1669



**PERSONAL RESPONSIBILITY CODE**

The member companies of FEMSA that provide emergency response equipment and services want responders to know and understand the following:

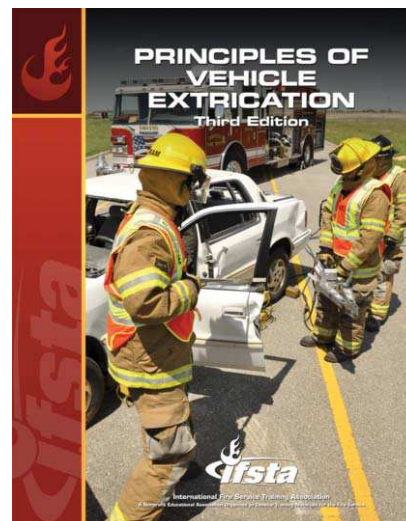
1. Firefighting and Emergency Response are inherently dangerous activities requiring proper training in their hazards and the use of extreme caution at all times.
2. It is your responsibility to read and understand any user's instructions, including purpose and limitations, provided with any piece of equipment you may be called upon to use.
3. It is your responsibility to know that you have been properly trained in Firefighting and /or Emergency Response and in the use, precautions, and care of any equipment you may be called upon to use.
4. It is your responsibility to be in proper physical condition and to maintain the personal skill level required to operate any equipment you may be called upon to use.
5. It is your responsibility to know that your equipment is in operable condition and has been maintained in accordance with the manufacturer's instructions.
6. Failure to follow these guidelines may result in death, burns or other severe injury.



Fire and Emergency Manufacturers and Service Association  
P.O. Box 147, Lynnfield, MA 01940 • www.FEMSA.org

**This Safety Manual is not intended as a substitute for proper training in the use of rescue systems as taught from credible sources such as the National Fire Protection Association (NFPA), The International Fire Service Training Association (IFSTA), or sources approved by the Authority Having Jurisdiction (AHJ).**





Examples of recent publications;



- NFPA 1670 2014 Edition – Standard on Operations and Training for Technical Search and Rescue Incidents
- IFSTA Principles of Vehicle Extrication, 3rd Edition, 2010, ISBN: 978-0-87939-380-9

## 1.0 MEANING OF SAFETY SIGNAL WORDS

A safety related message is identified by a safety alert symbol and a signal word to indicate the level of risk involved with a particular hazard. Per ANSI standard Z535.6-2011, the definitions of the four signal words are as follows:

- |  |   |
|--|---|
|  | <b>DANGER</b> indicates a hazardous situation which, if not avoided, will result in death or serious injury.              |
|  | <b>WARNING</b> indicates a hazardous situation which, if not avoided, could result in death or serious injury.            |
|  | <b>CAUTION</b> indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. |
|  | <b>NOTICE</b> is used to address practices not related to personal injury.  |

## 2.0 SAFETY

Safety is being addressed in a series of seven grouped safety messages organized by hazard type;

1. SUDDEN UNEXPECTED MOVEMENT OF LOADS
2. LACERATION, PROJECTILE, and PINCH POINT HAZARDS
3. ELECTROCUTION HAZARDS
4. HYDRAULIC FLUID ESCAPE HAZARDS
5. IGNITION and EXPLOSION HAZARDS
6. STRESS and STRAIN FROM MOVING HEAVY EQUIPMENT
7. INJURY FROM MIS-USE

In each section information will be given to;

- Identify the hazards to rescue workers, accident victims, and bystanders
- How to avoid the hazards
- Probable consequences of not avoiding the hazards

### 2.1 SUDDEN UNEXPECTED MOVEMENT OF LOADS

#### DANGER

Hydraulic tools can apply many tons of force which can bend, move, or lift large loads storing potential energy. Loads can become unstable and suddenly move without warning causing severe injury or death. Never support a load solely by a rescue tool. Use secondary supports to limit the extent of uncontrolled movements. Never put body parts in a situation where a shifting or falling load can cause a crushing injury. Stay clear of the path of travel.

- Metal-on-metal contact is likely to slide sideways when the load is not able to deform around the area of contact. Use care when lifting structural and hardened objects.
- Chains can break when overloaded or improperly loaded
- Spreader tips and rams can kick (move) when direction of force isn't perpendicular to load
- Loads can suddenly shift sideways when forced, lifted, or moved. Stabilize load to reduce risk of movement from ice, gravel, soft ground, precarious positions, objects which can break, wheels which depressurize or roll, and loading which can change during rescue operations.

### 2.2 LACERATION, PROJECTILE, and PINCH POINT HAZARDS

#### WARNING

Operating rescue tools can result in injury or death from laceration, projectile (high speed flying debris) and pinch point injuries. Stay clear of the path of travel. Avoid unnecessary risk. Examples include;

- Never lift, or hold a rescue tool by its cutting blades or spreader arms. Never place hands between moving tool and a load. Pinch points are created from tool movement causing risk of limb amputation (i.e. fingers, hands, arms, feet, legs).
- Sharp metal objects are formed during cutting and extrication causing potential for laceration and puncture wounds
- Projectiles can be ejected during cutting, spreading, or lifting operations when objects break suddenly under load. Sudden fractures are common with springs and hardened steels
- Inadvertently damaging pressurized objects such as airbag cylinders can create projectiles
- Cutting with dull or damaged blades can separate cutter blades (bending sideways) causing sudden breakage of blades or center bolt resulting in hazardous projectiles. If jaw separation occurs stop the cut immediately and reposition the tool. Cutter tips are not intended to cut strong hinges or pierce hardened metals.
- Using a rescue tool beyond its reasonable lifespan increases risk of fatigue failure. Expected lifetime of the tool is 10 years from the date of manufacture.
- Tools can drift (move side-to-side) as load is applied or released resulting in body parts being trapped and crushed between tool handles and stationary objects. Always be aware of body, hand, and finger position. Stop before harmful contact is made.

### 2.3 ELECTROCUTION HAZARDS

#### WARNING

Electric shock can result in injury or death. Rescue tools are made from metal which is a conductor of electricity. Electric current can flow from the hazard through the rescue tool to shock nearby people. Maintain awareness of potential hazards. Examples include;

- Never operate electric power units with damaged power cords. Do not drive over or crush power cords. Use care to avoid cutting power cords on sharp objects. Do not strain cords during storage. Hidden cord damage can remain undetected until wet conditions create an electrocution hazard.
- Electric power units are not waterproof. Do not submerge, or douse the power unit or its controls. Refer to manuals from motor manufacturer for specific details.
- Cutting into concealed spaces can be hazardous. Power cables and battery packs may be hidden from view in structures and electric vehicles.
- Never operate near damaged electric power lines before power is verified as OFF

## 2.4 HYDRAULIC FLUID ESCAPE HAZARDS



Hydraulic fluid (mineral oil) escaping under pressure can puncture the skin, infiltrate eyes, or lungs resulting in serious injury. Seek medical attention immediately. Avoid the urge to contain leaks with hands. Injection injuries require immediate medical attention. Safety Data Sheet (SDS) for AMKUS MV1 Hydraulic Fluid is available at [AMKUS.com](http://AMKUS.com) and [CHEMTREC.com](http://CHEMTREC.com)

Hydraulic leaks can occur from situations such as;

- Leaks at hose crimps and connections can develop from constant use, over-pressurization, side-loading, or mis-crimping.
- Hose damage from being driven over, stepped on, twisted, kinked, crushed, excessive vibration, abuse, or neglect.
- Leaks and breaks in hydraulic components can occur from improper maintenance or excessive service life expectations. Establish sound practices.
- Connecting hydraulic tools in series can pressurize both sides of double acting cylinders. Each tool must be separately connected to a power unit.
- Release stored pressure before servicing tools by moving off end stops. Refer to power unit manuals for proper operation.

## 2.5 IGNITION and EXPLOSION HAZARDS



Using rescue tools can cause ignition or explosion resulting in injury or death. Ignition or explosion can result from situations such as these;

- Flammable hazards are created when fuel lines, refrigerant lines (atomized oil), or pressurized hydraulic fluid lined are breached. Ignition sources can suddenly ignite these fuels.
- Flammable vapors can be released by careless refueling or operation of gasoline driven engines. Refer to engine manufacturer's manuals for specific details.
- Extrication tools can create sparks as metals are cut and deformed. Avoid unnecessary risk when flammable vapors are present.
- Power units with electric motors or internal combustion engines are ignition sources. Flammable vapors heavier than air can accumulate in low spots. Avoid selecting these locations when setting up the power units. Use detectors to verify safe site selection.

## 2.6 STRESS and STRAIN FROM MOVING HEAVY EQUIPMENT



Lifting or moving rescue tools and power units can result in falling or spine injury. Rescue tools and power units are heavy. Risk of injury increases in unfavorable conditions such as poor lighting, inclines, loose, wet, or icy surfaces. Follow accepted safe lifting practices.

## 2.7 INJURY FROM MISUSE



Misuse of AMKUS Rescue Systems can result in a wide variety of hazards and consequences. Remain aware of and avoid misuse situations. Examples of misuse includes;

- Using low pressure (5000 PSI) tools on high pressure (10,500 PSI) hydraulic power units creates high risk of hydraulic cylinder rupture. Ensure compatibility before use.
- Failure to inspect and properly maintain rescue equipment. Inspect all rescue equipment after each use. Any equipment found to be damaged or inoperable should be removed from service.
- Storage of rescue equipment in adverse conditions. Always store rescue equipment in clean, dry, and secure conditions.
- Operation of rescue equipment with missing or illegible safety markings
- Modification of tools and power units inconsistent with manufacturer's specifications
- Repairs attempted by unqualified workers.
- Use of rescue tools for non-rescue purposes such as; construction, production use, demolition, or as a jack for vehicle service.
- Pressure relief valve set over +5% above the Rated Output Pressure 10,500 PSI (724 bar)
- Using tools which have been heat damaged. Heating beyond 212 degrees F (100 C) will compromise the strength.

## 3.0 EQUIPMENT DAMAGE



Use of hydraulic fluids other than AMKUS MV1 can result in equipment damage and loss of function. Some examples include;

- Phosphate ester hydraulic fluids and blends are incompatible with Buna-n seal and hose materials used in AMKUS Rescue Systems
- Mixing glycol with mineral oils can result in gelling and plugging of pump inlet screens
- Using fluids with wrong viscosity or wear properties. Always use AMKUS MV1.

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