

THE IMPACT FACILITY

Technical Guide to ASGM Equipment

BOOSTING MINING EFFICIENCY & WORKPLACE SAFETY

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GOLD

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Introduction

Artisanal mining activities are defined by a low level of mechanization, using often hazardous and inefficient production and processing equipment. The Impact Facility is dedicated to providing miners with access to high quality equipment, appropriate to the mines' geological conditions and financial health. We believe that targeted investments can boost mine efficiency, worker health and safety and the overall profitability of the small businesses that artisanal and small-scale gold mines (ASGM) are.

To maximize benefit for miners on the ground investment in ASGM operations should focus on the procurement of mining equipment which is pivotal in the main stages of operations.

The Impact Facility is working to empower ASM communities economically, socially, and environmentally. We are providing miners with access to finance and equipment, capacity building, and ethical markets. Among those, we also offer mining equipment solutions that reduce or eliminates the use of mercury.

This guide is also intended to help mining investors and money lending institutions to understand what artisanal miners often are asking financial resources for, the machine profitability and their actual worth in the mining sector. In this Guide, We Outline the Key Mining equipment profiles, and since all the profiles are much alike, we have segmented information per equipment, the segments are as follows:

1. Equipment ratings; on Productivity, recovery and Health and Safety.
2. Cost Range for a new set Of the Equipment.
3. Equipment purpose and use in Mine
4. Operating and Maintenance of The Equipment.
5. Availability of the Equipment, specifications, and available Suppliers within East Africa/Kenya.
6. Best known manufactures for the Equipment Worldwide.

This guide is work under progress, and it has focussed on production and processing equipment as more information on smelting and safety equipment are compiled.

This guide was compiled Cyrus Njonde, mining engineer and Regional Manager for the Impact Facility in East Africa with the support of aspiring mining engineer Jill Munyes,.

For More Information/Feedback, please send Email to team@impactfacility.com

Handheld Rock Drills

Increase in Production	Increase of Recovery	Increase of OHS
very strong	neutral	strong

Availability	Costs	Maintenance
2-5 weeks	\$2,500	easy



What is it used for, and how does it work?

This equipment is used for drilling holes on solid rock; these holes are filled with explosives that help in breaking the rock apart.

A handle with a centrifugal piston is driven by compressed air that is converted into circular forward motion by a valve; this motion hits the male end of a drilling rod, gets into contact with a rock, it creates a circular hole corresponding to the drill diameter. Several drill holes on a rock once loaded with explosives shatter the stone.

The pusher leg is used to support the drill when performing horizontal penetration.

How to use:

The operator needs to first make a good grip of the drill through the handles provided. He will then switch on the air valve, and the drill bit rotates readily to penetrate in the rock.

Drill operators should maintain a relaxed grip on the handles, reducing the conduction of vibrations and impacts to hands, wrists, arms, and elbows. Drillers need to be attentive to the behaviour of the drill and conscious of the type of rock they are drilling.

How to maintain:

Daily check up on all movable parts with correct greasing of those areas is very important, tightening any loose bolt and nuts due to the continuous vibration and general checking of wears and tears in the drill bit. A good drill should serve a miner 1-2yrs before the need to replace worn parts.



Availability of spare parts Technicians:

With the availability of many outlets Mining shops in Kenya, it is possible to get spares for this equipment after one day of the order; additionally, there are technicians in the field, repairs can be executed with minimum time.

Accessories needed to operate:

Must-Have: Pusher Legs, Lubricator, Drills, Bits Generator, Compressor.

Additional: Longer Electrical cables.

Standard Technical Specifications

Hole length 1.2m

Hole Diameter 22-38mm

Air Consumption 7 bars

Legal Permits Required

Trained Operator, OHS Certificate.

Warranty

Usually 1-year warranty

Known Equipment Vendors

Company name: Atlas Copco East Africa

Email address: peter.maina@atlascopco.com

Contacts Contact number: +254721789635

Physical Location: Nairobi, Mombasa Road.

Company Name: Epiroc Kenya

Email Address: evans.mabeya@epiroc.com

Contact numbers: +254709556000

Physical location: Nairobi, Mombasa Road, Sameer Business park.

Specialists Drill Contractors

Rift valley Excavators Ltd,

Email address: rftvalleyexcavators@gmail.com

Contact Number: +254723988134

Physical Location: Nairobi, Kenya.

High-Quality Manufacturers



Explosives

Increase in Production	Increase of Recovery	Increase of OHS
very strong	neutral	strong

Availability	Costs	Maintenance
One week	\$50-\$100	Expensive



What is it used for, and how does it work?

Mining explosives are substances which detonate to produce a high-intensity shock wave and large volumes of gas which, being confined in a hole, expand rapidly, entering existing minor cracks in the rock, and creating new cracks to break the stone.

The most common Explosive that is used both small scale and large scale is a mixture of Ammonium nitrate and fuel oil (ANFO). This mixture is cheap and easy to manufacture.

It is important not to confuse Explosives and the accessories that are used during blasting, these are the detonators, which are used to initiate blasts in a controlled manner

How to use

A miner will drill blast holes either by use of hammer and chisel of at least 1.5 ft deep or hire a hand drill and compressor, the hole run either horizontally or vertically depending with the rock orientation.

He will prepare ANFO by thoroughly mixing a few kilograms of Ammonium Nitrate and Diesel fuel.

Insert the detonator inside a primer (Cartridge of high energy explosive to kick start explosion) with the electrical wire remaining in the surface, then load the ANFO pellet while stemming from containing the energy of explosive fully.

On top, cover with soil firmly and all the detonators electrical wires are joins. Activate the exploder, when you are away from the underground Mine or many metres away from the blasting area, with the cable connecting to the blast holes and the exploder, activate the detonators, and they will initiate the blasting process, entirely disintegrating rocks.



How to maintain

All unused ANFO and detonators should be safely stored in the Magazine, and area designated to store explosives. Blasting exercise and exploders to be used by a certified blaster, who recommends the blasting quantity and ratio. Stay away from blasting area, notify nearby people of the blasting operation, no one should be in mine pit during Blasting operation

Availability Explosives/Specialists

Kenya is becoming centre for ANFO/Explosive manufactures and vendors, due to the rising demands in other mining activities like ballasts, limestones, road constructions and tunnels, they necessitate the use of explosives.

The number of specialists is rising, Detonators and primers are sold in certified shops in Nairobi.

Accessories needed to operate

Must-have: detonators, primers, exploder, and certified blaster.

Additional: Fieldworkers.

Standard Technical Specifications

Model: Nonel and Electric Detonators

Functional time: 25 Milliseconds

Legal Permits Required

Yes, Blaster Licence And OHS certificate.

Warranty

No warranty.

Known Vendors

Company name: Twiga Chemicals Ltd

Contact Numbers: +254742967573

Website: <http://www.twigachemicals.com/>

Physical Location: Nanyuki Road Industrial Area, Nairobi.

Specialists/Blasters

Rift valley Excavators Ltd,

Email address: rftvalleyexcavators@gmail.com

Contact Number: 0723988134

Physical Location: Nairobi Kenya.

High-Quality Manufacturers



Mining Winches

Increase in Production	Increase of Recovery	Increase of OHS
very strong	neutral	strong
Availability	Costs	Maintenance
4-6 weeks	\$10,000 - \$15,000	easy



What is it used for, and how does it work?

This is an electrical system which helps Miners to remove mined materials (Wastes and Ore) from mine pit and lift miners.

Drum hoisting system of mining suits artisanal miners pit of 10m-200m, this is a rope wire stored in a drum and operated by a geared motor system to lift material from the pit bottom to the top and back. The wire rope winds itself round the drum during operations, the winch system is usually located at some distance from the shaft and require a head frame and sheaves to centre the hoisting ropes in the shaft compartment.

How to use

A trained operator controls the hoisting system made up of a Geared electric motor, a clutch, differential and drive axle the cable is wound up in a rim used as a drum.

Through Indicators such as radio calls and bells signals between the operator and miners below the shaft, the operator controls the shaft elevator that carries the bucket with the available up or down buttons.

When the bucket is loaded with ore/waste below the mining shaft, the operator is notified, and he will operate the up buttons lifting the materials to the surface.

In case of emergency, the operator is provided with an emergency braking system which helps to stop the moving bucket immediately.

Availability of spare parts

Motors and gears are available in many shops; other elements like wire ropes can be procured upon the order.

Accessories needed to operate

Must-have: generator/grid power, Wire rope, 3 phase electrical cables, Distribution board.

Additional: Fabricated Headframe, caged frame to cover motor.

Standard Technical Specifications

Type: Single drum

Loading Capacity: 500kg-1 tonne

Working speed: 20-35m/min

Power supply: 220-690V, 50/60HZ, 3Phase



Legal Permits Required

Trained Operator, OHS Certificate

Warranty

Usually 1-year warranty,

Known Vendors

Company name: Achelis Material Handling Limited

Email address: achelis@achelis-group.com

Contacts Contact number: +254725542671

Physical Location: Opposite Tuskys Head office, Mombasa Road Nairobi.

Company name: Speed craft Engineering Ltd

Email address: speedcraftengineering@gmail.com

Contacts number: +254723993938

Physical Location: Nairobi, Industrial area, Kitui Road.

Local Specialists/Technician

Company: Maxius Engineering Ltd.

Email: maxiusengltd@gmail.com

Contacts Contact number: +254712089695

Physical Location: Nairobi, Thika Town.

High-Quality Manufacturers



Achelis
Group of Companies



Give You A Crane
You Can Lift The World



Submersible Pumps

Increase in Production	Increase of Recovery	Increase of OHS
very strong	neutral	strong

Availability	Costs	Maintenance
2-5 weeks	\$2,500-\$7,500	easy



What is it used for, and how does it work?

This is a piece of simple equipment used to remove water from a mine pit and during operation, It is fully covered with water.

On its top part, an electrical cable with a hermetic sealing(watertight) not to allow water inside the pump runs inside of the pump to supply the motor with power; the pump has a water inlet and outlet connected to external piping to remove water that is sucked by the machine. Ideally, a pump is made up of a cylinder cover inside an electrically driven motor, the motor that drives an

impellor upon power input, the impeller creates pressure to push water out of mine depth from 10m-100m and above. The bottom of the pit determines the type/capacity of the pump to use, with huge pump pumping over 100m pit water out of big mines.



How to use

You will need to find the best drainage point where you can leave the pump submerged in the water pool for a while before it drains all the water. Connect a long hose that will drain water to the farthest end of the flooded area/pit, from then connect the cable from the pump to the power source and plugin.

The pump should start getting the job done, and this will continue until all the water is discharged.

How to maintain

After removing the pump from the Muddy water, wash off the mud and ensure that all the particles near the sieve close to the impeller are removed to prevent clogging.

Avoid dropping the pump or leaving it in the open sun.

Availability of spare parts

Common challenges of submersible pumps usually are motor getting worn out and winding failures, and this takes place when the pump is operating without water. Fortunately, specialists are now available to give pumps a new life through rewinding the motor, and the pump can again work. All spare parts can be made available upon a call to several shops, and this can take at least 24hrs.

Accessories needed to operate

Must-have: generator/grid power, electrical cables, Distribution board (circuit breaker/Phase failure), water pipe PVC

Additional: Longer electrical cable.

Standard Technical Specifications

Type: Weda (10-60)

Dewatering capacity: 60m³/Hr

Waste nature: Clearwater with little mud

Power supply: Single/Three-phase

Legal Permits Required

None

Warranty

Usually 1-year warranty.

Known Vendors

Company name: Atlas Copco East Africa

Email address: geoffrey.githaiga@atlascopco.com

Contacts Contact number: +254734747560

Physical Location's Road Nairobi. City Cabanas

Company name: Speed craft Engineering Ltd

Email address: speedcraftengineering@gmail.com

Contacts Contact number: +254723993938

Physical Location: Nairobi, Industrial area, Kitui Road.

Local Specialists/Technician

Company: Maxius Engineering Ltd.

Email: maxiusengltd@gmail.com

Contacts Contact number: +254712089695

Physical Location: Nairobi, Thika Town.

High-Quality Manufacturers



Surface Dewatering Pumps

Increase in Production	Increase of Recovery	Increase of OHS
very strong	neutral	strong
Availability	Costs	Maintenance
2-5 weeks	\$20,000-\$35,000	easy



What is it used for, and how does it work?

Unlike the submersible pumps which require immersing the pump in the water, the surface dewatering Pump works on the surface, connected with a long suction pipe to the water level, they push the water by vacuum principle.

Most of the surface pump works Through centrifugal force, to discharge water via an outlet pipe, often into a dewatering tank or pond, far from the location of the actual pumping operation.

How to use

Before turning on the pump, the operator will need to check the Engine oil and fuel (petrol or diesel) through use of a button or pulling a starting cable with tight and quick grip to run the system. The engine will start.

Proper setting of the operating speed will need a trained person to understand the right working condition; Connect the pump on both Inlet and outlet with Hoses tightly and submerge the inlet pump to the water area that requires to be removed while the outlet end to the area that the water needs to be discharged



How to maintain

Proper checkup of the Engine; It will need to be changed after the specified running time of the engine.

The pump needs to be well stored after operations, and should not be near water, or inside of the water, a safe distance from the water body should be observed while in operation.

Availability of spare parts

For most of the cheap pumps, one can find spare parts in most outlets shops within the country while for some of the most sophisticated brands, it might take weeks to import spare parts. Fixing these pumps will also require a competent technician in Kenya, they can always advise on other compatible spares readily available.

Accessories needed to operate

Must-have: durable water pipes PVC, Rings Hose clips and rings.

Additional: strong base due to vibrations and stability.

Standard Technical Specifications

Dewatering Capacity: 300m³/hr

Head: 133.7m

Waste nature: Drainage, Sludge, and slurry

Power supply: Single/Three-phase

Legal Permits Required

None

Warranty

Usually 1-year warranty.

Known Vendors

Company name: Atlas Copco East Africa

Email address: geoffrey.githaiga@atlascopco.com

Contacts Contact number: +254734747560

Physical Location's Road Nairobi. City Cabanas

Company name: Speed craft Engineering Ltd

Email address: speedcraftengineering@gmail.com

Contacts Contact number: +254723993938

Physical Location: Nairobi, Industrial area, Kitui Road.

Local Specialists/Technician

Company: Maxius Engineering Ltd.

Email: maxiusengltd@gmail.com

Contacts Contact number: +254712089695

Physical Location: Nairobi, Thika Town.

High-Quality Manufacturers



Site Dumpers

Increase in Production	Increase of Recovery	Increase of OHS
very strong	neutral	strong

Availability	Costs	Maintenance
2-4 weeks	\$10,000-\$20,000	easy



What is it used for, and how does it work?

Easy to use as well as maintain, Site dumpers are engine driven automotive used for carrying loose materials like sand, ore, gravel, etc. from one place to the other. They come in various sizes and classes such as standard, articulated, transfer and off-road haul.

Site dumpers carrying capacity helps it to be used in artisanal miners for small loads and narrow roadways, They are designed to drive and carry loads on the front rather than bucket being located at the back like most of bigger dumpers.

How to use

By use of a standard steering wheel and gears system. The operator can drive the truck to the required area of operation in a mine

Sit on the operator's seat and fasten your safety belt, check all the necessary indicators on the dashboard and if all the signs show the engine and oil levels are okay, start the engine, wait for some minute to warm the engine before you drive off to the required working area in the Mine

Just like a heavy machine, site dumpers need a skilled driver who can work with it in all kind of mine terrains.

How to maintain

Proper maintenance of a site dumpers should be a pivotal thing to always consider for the longevity of the equipment.

Daily inspections such as Hydraulic oils, leaks, coolant, fuel, it is essential to have a checklist of all the inspection areas. Ideally, significant replacements of oil and fuel filters, as well as air cleaners, should happen after manufacturers recommended working hours for the machine.

Availability of spare parts

Site dumpers are not very popular Kenya industry; they are, however increasing due to the growing demand for artisanal gold and infrastructure in the nation.

Heavy machine shops can easily import them for you; these shops deal with the also the sale of spare parts, service and repairs from their trained technicians.



Accessories needed to operate

Must-have: enough fuel and storage, Grease, and grease gun, trained operator
Additional: operator assistant and field mechanic.

Standard Technical Specifications

Brand: Terex
Capacity: 1-2 tonnes
Power: 20-30Hp
Discharge Height: 1.5metres

Legal Permits Required

Driving Licence Class D

Warranty

Usually 1-year warranty.

Known Vendors

Company name: Mantrac Kenya Ltd
Email address: ewere@mantrackkenya.com
Contacts Contact number: +254 725386632
Physical Location: Mombasa Road Opposite Nyayo Stadium

High-Quality Manufacturers



Backhoe Loader

Increase in Production	Increase of Recovery	Increase of OHS
very strong	neutral	strong

Availability	Costs	Maintenance
3 weeks	\$30,000-\$45,000	easy



What is it used for, and how does it work?

With a shape of a scorpion, a backhoe loader is an excavation machine supports a digging bucket on the end of a jointed two-part arm. While on the other end will often have a front loader attachment where the name Backhoe loader is derived, so the seat swivels 360 degrees to allow the operator to face whichever side is being used at the time.

It is essential in mining in that they can easily remove a large mass of overburden, dig soft rocks, lift, and load rock boulders and soil in a short time, with the advantage of a rotating platform operators' seat.

How to use

To get started, you need to seat on the Operator cabin close the door become familiar with the controls. Learn how the right and left joysticks control the cab, boom, stick, and bucket. After this, ignite the engine Then drive the excavator with its foot pedals, to the area where you need to move the overburden Finally, combine all these motions to complete your first dig.

Backhoe loaders need a trained operator; otherwise, operating without proper training can be fatal to people and surrounding structures.

How to maintain

Proper maintenance of backhoe ensures maximization of fuel efficiency. It reduces operating costs as well as equipment failure, daily inspections such as Hydraulic oils, leaks, coolant, fuel; it is essential to have a checklist of all the inspection areas. Ideally, significant replacements of oil and fuel filters, as well as air cleaners, should happen after manufacturers recommended working hours for the machine, usually 5000hrs being standard hours for the next service.



Availability of spare parts

In Kenya, there has been a lot of shops which deals with Excavators; this means that getting an excavator would usually take a few days to get it delivered in a mine site.

There are also specialized, trained technicians and operators for this machine, lastly, getting a spare part for your excavator is now easy. One need not import, which means less downtime to Fix the machine parts.

Accessories needed to operate

Must-have: enough fuel and storage, Grease, and grease gun.

Additional: operator assistant, field technician.

Standard Technical Specifications

Model: CAT 424B2

Bucket capacity: 1.0m³

Backhoe capacity: 0.24m³

Power: 80HP

Legal Permits Required

Driving license Class D

Availability Within East Africa

3 weeks

Warranty

Usually 1-year warranty.

Known Vendors

Company name: Mantrac Kenya Ltd

Email address: ewere@mantrackkenya.com

Contacts Contact number: +254 725386632

Physical Location's Mombasa Road Opposite Nyayo Stadium

High-Quality Manufacturers



Jaw Crushers

Increase in Production	Increase of Recovery	Increase of OHS
very strong	neutral	strong

Availability	Costs	Maintenance
2-5 weeks	\$4,000-\$7,000	easy



What is it used for, and how does it work?

Jaw crushers serve as the primary form of size reduction in a mine, and they reduce the size of gold or large boulder minerals ore by compressing them with two plates one movable and the other is mobile.

It is made up of a fixed jaw and a movable jaw When the rock is placed in these two v-forming plates, the reduction starts gradually up to the bottom where the size is always set. This space forms the product size gap. The rock remains in the jaws until it is small enough to pass through the bottom gap set. Besides the two jaws, the covering of the jaw crushers is made up of thick cast iron or steel; the jaws

also are made from cast iron but fitted with liners made of manganese.

How to use

Before powering the engine/motor, the operator needs to physically check the crusher components like the belt, any loose bolts and broken element.

The operator can now power the crusher and ensure that rocks are adequately fed on the hollow top opening while ensuring that no one touches the rotating wheel or the belt connecting the power with the flying wheel.

How to maintain

Jaw crusher moving parts which have bearings requires regular greasing through the nipples.

The belt tension needs to be checked every day to ensure that it is in its right tension

Adjustments for the right size of the gap at the output of the crusher should always be checked during operation.

The operator needs to check all bolts sections that always loosen due to vibrations.



Availability of spare parts

Currently, there are over ten outlets shops that stock Jaw crushers, with the demand for the Equipment in Gold crushing and other crushing activities, spare parts are very much available in a day call, there are also technicians who can always repair a faulty component of a crusher on time.

Accessories needed to operate

Must-have: generator/grid power/Diesel engine, 3 phase electrical cable V-belt.

Additional: Supporting frames with tyres for mobility, Conveyor belt feeding system.

Standard Technical Specifications

Crusher capacity: 5tonnes/hr

Model: PE150x250

Adjustment size: 10-50mm

Power supply: Three-phase

Legal Permits Required

Trained operator, OHS certificate

Warranty

Usually 1-year warranty

Known Vendors

Company name: Nile Machinery Ltd

Email address: simonmutuku@gmail.com

Contacts number: +254718737049

Physical Location: Mombasa road, Mlolongo

Company name: Camco Equipment K Ltd

Email address: marketing-ke@camco.cn

Contact number: +254702829268

Physical Location: Mombasa Road, Cabanas

Local Fabricators /Technician

Company: Maxius Engineering Ltd.

Email: maxiusengltd@gmail.com

Contact number: +254712089695

Physical Location: Nairobi, Thika Town.

High-Quality Manufacturers



Ball Mills

Increase in Production	Increase of Recovery	Increase of OHS
Neutral	Very High	strong

Availability	Costs	Maintenance
2-5 weeks	\$4,000-\$7,000	easy



What is it used for, and how does it work?

This equipment is considered as the secondary crushing after the primary process is done.

It is used to grind kinds of materials into fine powder 20-75micrometer, Ball mill grinding machine is made up of horizontal drum with external gear or diesel engine.

Materials are fed in an opening that is now closed tight once the materials are put in the mill. Through the rotation of steel balls of different specifications that grind the contents inside the mill, Steel balls are taken to a certain height by centrifugal force from drum rotation and then falls crushing the materials to powder.

How to use

An operator will pour the materials to be crushed into the hollow ball mill and tightly close with a lid. After this, he will power the engine system or motor which will rotate the ball mill for some time at least 20minutes before stopping

The operator will then open the lid and pour the crushed materials in the form of powder

Ball mills require a trained operator to understand the time necessary to grind materials to their right size to avoid over-grinding and under grinding.

How to maintain

Since the main grinding materials are steel balls that are typically stored inside the mill, they undergo through abrasion effects which leads to tears and cracking into pieces; the operator should regularly check and remove the faulty balls and replace the worn-out ones.

The gearbox attached with the motor needs to be greased and checked on the oil regularly.

Removal of old grease in bearing areas is also essential since there is a lot of dust mixing with oil and could lead to bearings inefficient.



Availability of spare parts

Most spare parts are available locally; grinding balls are sometimes scarce to get as most that are used are second hand from cement ball mills, repairs for a ball mill most times involves welding worn out part as well as motor and gears which could develop complication, the shaft bearings as well would need to be replaced with new bearings which are readily available locally.

Accessories needed to operate

Must-have: Generator/Grid power, Grinding balls.
Supporting accessories: Safety equipment, dust masks

Standard Technical Specifications

Crusher capacity: 2-4t/hr
Power capacity: 75KW
Discharging size: 0.074-0.4mm

Legal Permits Required

Trained Operator with OHS certificate.

Warranty

Usually 1-year warranty

Known Vendors

Company name: Speed craft Engineering Ltd
Email address: speedcraftengineering@gmail.com
Contacts Contact number: +254723993938
Physical Location: Nairobi, Industrial area, Kitui Road.

Company name: Nile Machinery Ltd
Email address: simonmutuku@gmail.com
Contact number: +254718737049
Physical Location: Mombasa road, Mlolongo

Local Fabricators /Technician

Company: Maxius Engineering Ltd.
Email: maxiusengltd@gmail.com
Contacts Contact number: +254712089695
Physical Location: Nairobi, Thika Town.

High-Quality Manufacturers



Improved Sluice Boxes

Increase in Production	Increase of Recovery	Increase of OHS
Neutral	Very High	Strong

Availability	Costs	Maintenance
2-5 weeks	\$900	Easy



What is it used for, and how does it work?

Improved sluice boxes are Used for separation of gold through the use of flowing water; Sluices are long narrow tables designed to allow water to pass through them, through this, water that passes through with gold ore can be separate gold from other materials.

Gold is observed to trap in the sluice box riffles; these are obstruction specially designed to ensure that a fabric traps gold and the heavier element beneath the sluice box. The unique structure may either be miners Moss, carpeting or rubber matting.

Once the material ore is finished from running on top of the sluice box, the water supply running continuously through the use of motorized water supply or if the operation is being done at the river streams, the box is removed and taken to a big basin full of water for the next separation stage. The sluice box is generally mounted on four-legged stands to give the table the right slope.

How to use

Where the table is not motorized, the operator should ensure that the amount fed on the top of the box is wet and can flow easily on top of the table.

The gradient of the box should be one inch per foot of drop(1inch height per length foot), setting gradient requires judgement while and could be hard for the first-timers.

When the box gets clogged by sediment, this means increasing the speed of water or inclining the box more, very few, or no sediment sometimes may mean that the water speed is high or the box is too steep and would need to be inclined a little.

It is not advisable to add a lot of materials in the box at once as this may overload the box riffles and not achieving better results.

How to maintain

Always keep the riffles clean; clogged riffles mean a less effective recovery, after work, the box together with the feeder should be thoroughly washed to ensure that the equipment does not have clogged ends which will affect operations in future.

The Miner's moss/Matts always need to be clean.



Availability of spare parts

Due to the ineffective nature of the current ASM sluicing technology (40% gold recovery) modern sluice materials becoming popular in Kenya.

Available shops are found in Tanzania together with trained technicians, one can also import from South Africa and Ghana shops.

The central spare part includes the rubber mat/Miners Moss which can be purchased as a big roll and used for several years before wears.

Accessories needed to operate

Must-have: water pump, Water tank, Generator, Miners moss/Carpet/Rubber mat, water pipes connection and plumbing.

Additional: Longer water pipe, feeding spoon.

Standard Technical Specifications

Measurements: 10" wide x 48" long x 3"

Processing capacity: 50kg/Hr

Legal Permits Required

Trained technician, Processing technology certificate

Warranty

Usually 1-year warranty

Known Vendors

Company name: Akili Minerals services Ltd.

Email address: joseph.komu87@gmail.com

Contacts number: +254726216110

Physical Location: Nairobi, Ngong.

Company name: Borassus Company Ltd

Email address: hamishmanning@borassus.com

Contacts: +255 784345387

Physical Location: Tanzania.

High-Quality Manufacturers



Great selection and prices on gold prospecting equipment!

Centrifugal concentrators

Increase in Production	Increase of Recovery	Increase of OHS
Neutral	Very High	Strong

Availability	Costs	Maintenance
2-5 weeks	\$2,500- \$3,500	Easy



What is it used for, and how does it work?

There are many varieties of the centrifugal concentrator, they usually employ the same principle but different models, for the sake of our research as ASM solution providers, The Impact facility knows which concentrator best suits ASM miners.

We discuss one brand by South African processing equipment specialized company APT, Gold Kacha, which is a small equipment that is customized for the concentration of gold by the principle of centrifugal force.

How to use

With a pipe of running water, the gold ore is fed on top of the sieve opening of the gold kacha while water is run over the ore and wetting it ready to enter in the swirling bowl run by a motor at a moderate speed enough to sweep away lighter materials while heavy one is embedded in the riffles of the bowl.

Once the ore is done, the equipment should be opened, and sieve kept aside while the heavy materials are removed thoroughly by washing well and emptying the rich slurry through an outlet just below the equipment ready for further processing.

How to maintain

Gold Kacha has is powered equipment which needs extra care from water spilling on the covered motor and heavy rains.

Wash the equipment once the work is done, thoroughly washing the riffled bowl to avoid clogging which interferes with the next process.

Availability of spare parts

The power side of the gold kacha made up of a particular motor which may not be readily available. The bowl made of special material riffles can be imported or replaced from nearest agents of this Equipment in Tanzania.

Accessories needed to operate

Must-have: water tank reservoir, Generator, Electrical cable, Sluice mat.



Standard Technical Specifications

Feed rate: 1-3tph

Electric Motor): 0.75Kw

Water Requirement 2-4 m3/hr

Legal Permits Required

Trained technician, Processing technology certificate

Warranty

Usually 1-year warranty

Known Vendors

Company name: Akili Minerals services Ltd.

Email address: joseph.komu87@gmail.com

Contacts number: +254726216110

Physical Location: Nairobi, Ngong.

Company name: Borassus Company Ltd

Email address: hamishmanning@borassus.com

Contacts: +255 784345387

Physical Location: Tanzania.

High-Quality Manufacturers



WELL-TECH INTERNATIONAL

Gravity concentrators (Shaking Table)

Increase in Production	Increase of Recovery	Increase of OHS
Neutral	Very High	Strong

Availability	Costs	Maintenance
2-5 weeks	\$9,000-\$10,000	Easy



What is it used for, and how does it work?

It is used for separating light and heavy minerals (Gold) by the asymmetric reciprocating motion of the table surface. Depending on the materials nature, the action can always be adjusted to separate heavy and light materials efficiently. The motion comes from a motor beneath the table which is eccentrically coupled with a camshaft thrust resulting in a nonlinear motion resulting in a vibration effect.

The combined action of the symmetrical reciprocating motion of a mechanical slab and the flow of water on a thin inclined plane causes loose layering and zoning of ore

particles on the table surface that is normally riffled on its surface, thereby causing the mineral separation process to be carried out according to different densities.

How to use

A slurry is fed on one end of the vibrating shaking table; there are always beams of water flowing on the table, these serve to wash away any light materials away from the table while the heavier elements are typically left on the table near the centre. Heavy materials will follow one direction to a bucket of water. In contrast, all other light contents will be emptied to a different basin. This concentrate is usually the last process and will, therefore, be panned ready for smelting.

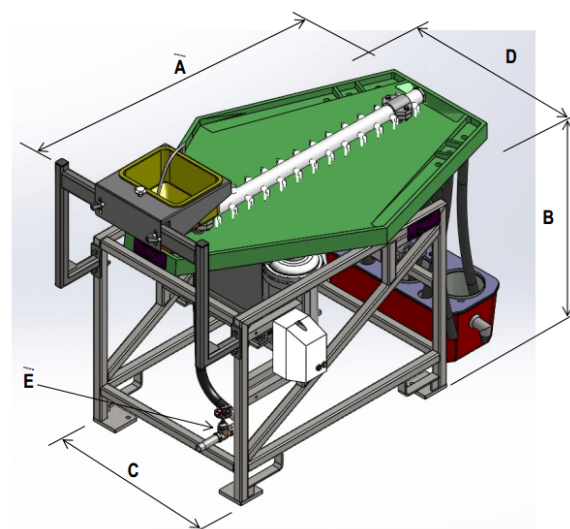
How to maintain

Shaking table is sensitive to levels; it is, therefore, important to ensure that the ground where it is installed is levelled and no surrounding ground movements.

Since the equipment is powered, it will need an electrician always to check the condition of the motor.

For the long life of the table, it would be right to have a shelter since the material that makes the tabletop is hard plastic, and it could be damaged by prolonged sun heating.

Protect the table from scratching by vandalism; this may interfere with the separation mechanism of the equipment.



Availability of spare parts

Most of the components for this equipment are repairable. The motor is sensitive and would always require a competent person to fix it in case of failure.

Technicians for this equipment are now available in Kenya and neighbouring Tanzania where some of the delicate components can be sourced.

Accessories needed to operate

Must-have: water tank reservoir, Buckets of water for concentrates, A shaded area away from the sun.

Additional: feeding spoon/small Bucket.

Standard Technical Specifications

Feedrate:30-50kg/Hr

Electric Motor): 0.75Kw

Water Requirement 1 m3/h

Legal Permits Required

Trained technician, Processing technology certificate

Warranty

Usually 1-year warranty

Known Local Vendors

Company name: Akili Minerals services Ltd.

Email address: joseph.komu87@gmail.com

Contacts number: +254726216110

Physical Location: Nairobi, Ngong.

Company name: Borassus Company Ltd

Email address: hamishmanning@borassus.com

Contacts: +255 784345387

Physical Location: Tanzania.

High-Quality Manufacturers



WELL-TECH INTERNATIONAL



Retort

Increase in Production	Increase of Recovery	Increase of OHS
Neutral	Very High	Strong

Availability	Costs	Maintenance
2-5 weeks	\$100	Easy



What is it used for, and how does it work?

A retort is a small equipment that can easily be fabricated locally, whose purpose is to ensure that the burning of a gold amalgam process will not generate fumes emission to the atmosphere.

When amalgam ball is inserted at the burning porch/point, and lid tightened, the roasting process ensures that the mercury fumes are condensed/cooled by a water jacket surrounding the pipe and collected into a separate container for re-use.

How to use

Amalgam is inserted and tightly closed-back; after this, you start heating the bowl from below with a torch. As a result, the mercury in the amalgam begins to evaporate and travels through the pipe where there is another big pipe with circulating cold water; this cools off the mercury vapour to liquid back which collects in the water collector and can be re-used.



How to maintain

Retort must be kept in a dry place and out of rains and moistures. It is also essential to check the welded parts of the retort tube that they are not leaking which can be harmful to the user who might be unaware of.

Availability of spare parts

A retort tube requires metal tubes components and water pipe for water circulations; the parts are readily available in most hardware shops.

Parts which would need replacement can be bought in the nearest hardware shops.

Accessories needed to operate

Apart from the Equipment, Water and pipe from a running source are needed, a small bucket with clean water to help collect the recovered mercury, Source of fire to heat the amalgam part.

Legal Permits Required

Trained technician, Smelting technology certificate.

Known Local Fabricators

Company name: Maxius Engineering Ltd

Email address: maxiusengltd@gmail.com

Contacts Contact number: +254712089695

Physical Location: Nairobi, Thika Town.

Generator

Increase in Production	Increase of Recovery	Increase of OHS
Very high	Very High	Strong

Availability	Costs	Maintenance
2 weeks	\$10,000 - \$15,000	Easy



What is it used for, and how does it work?

Electric generators is an equipment that is used to supply electricity mainly where main/grid power is unavailable or insufficient.

In the mines, generator plays a crucial role in running most of the production and processing equipment.

This equipment converts mechanical energy into electrical energy in this case, the internal combustion of the engine is converted to electrical energy by the alternator, This electrical power is connected to equipment that uses electricity to run, e.g. Pumps, Winches, mills, crushers etc.

How to use

Before starting a generator, it is essential to check if it has enough fuel for your day, there is usually an operator panel area provided to check this.

The operator will then needs to check that the power output panel/circuit is not connected to live equipment. After this is done, the operator can press on the button, and the generator should start to run automatically.

How to maintain

One of the critical things to a durable generator is having a planned maintenance program, performing service, maintenance, inspections and testing on a generator set on a pre-determined schedule.

The maintenance program should include inspections; the inspection is, fuel and oil filters, coolant and air filter. Never remove the pressure cap from a hot engine. Wait until the coolant temperature is below 120°F (50°C) before removing the pressure cap. Heated coolant spray or steam can cause injury.



Availability of spare parts

Many shops sell ready new generators nowadays, spare parts are in many varieties and also depending on the quality of generators cost depends on the quality and the company brands, with Chinese dominating the industry in Kenya. Technicians are also available to attend to onsite repairs and maintenance needs.

Accessories needed to operate

Must-have: Fuel(diesel)storage, External distribution board for power output, Electrical cables.

Standard Technical Specifications

Power output: 30KVA

Fuel type: Diesel

Fuel Tank Capacity Range: 75 Litres

Speed: 1500rpm

Legal Permits Required

A technician Mechanic certificate.

Warranty

Usually 1-year warranty

Known Vendors

Company name: Blackwood Hodge

Email address: francis@blackwoodhodge.com

Contacts Contact number: +254 727981259

Physical Location: Enterprise Road, Homa Bay Road, Nairobi.

Company name: Generators Kenya Ltd

Email address: info@generatorskenya.co.ke

Contacts number: +254 714988695

Physical Location: Baricho Road, Opposite CMC.

Known Specialists/Hiring Services

Company Name: Texah Drilling and Blasting.

Email Address: texahdb@gmail.com

Contact numbers: +254700699642

Physical location: Ruiru off Eastern Bypass, Nairobi.

High-Quality Manufacturers



Compressors

Increase in Production	Increase of Recovery	Increase of OHS
Very high	Very High	Strong
Availability	Costs	Maintenance
2 weeks	\$7,000-\$12,000	Easy



What is it used for, and how does it work?

Air compressors are used to provide air pressure required to drive a pneumatic hand rock drill used for drilling holes and rock breakage in a mine,

When the engine runs inside the compressor, the energy is converted into a compressed air which is stored in a tank; when there are enough compressed air the compressor unit cuts off from receiving compressed air even when the engine runs, The compressed air is connected by special rubber tubes, hoses which convey the air to other equipment like the jackhammer and different types of drills.

How to Use

Operating a compressor requires an operator who is well trained to understand the equipment, pressure gauges and required output to the drilling system.

The operator will ignite the engine and after this connect the air valves with hoses tightly plugged before opening the valve to release the air for use in drilling and other applications.

Monitor the pressure gauges to keep the air pressure in the tube below the amount listed on your power tool.

How to maintain

Proper maintenance includes the following manufacturer recommendations for service intervals and using factory or OEM parts, filters, and fluids.

Routine maintenance intervals are usually based on hours of use, but daily, weekly, and monthly maintenance checks should also be conducted.

Replace a minor part. For instance, a cracked fan drive belt is an indication of excessive wear and an opportunity for proactive replacement before a shredded belt causes a machine shutdown.

Availability of spare parts

Many shops sell ready new compressors nowadays, and spare parts are also very much available, Technicians are also available, to attend to onsite repairs and maintenance needs.



Accessories needed to operate

Must-have: Fuel (diesel) storage, quality hoses and clips

Standard Technical Specifications

Power output: 5-10bars

Fuel type: Diesel

Air quantity: 10-2-M³/Min

Legal Permits Required

A technician Mechanic certificate.

Warranty

Usually 1-year warranty

Known Vendors

Company Name: Epiroc Kenya

Email Address: evans.mabeya@epiroc.com

Contact numbers: +254709556000

Physical location: Nairobi, Mombasa Road, Sameer Business park.

Company name: Atlas Copco East Africa

Email address: geoffrey.githaiga@atlascopco.com

Contacts number: +254734747560

Physical Location: Road, Nairobi. City Cabanas

Known Specialists/Hiring Services

Company Name: Texah Drilling and Blasting.

Email Address: texahdb@gmail.com

Contact numbers: +254700699642

Physical location: Ruiru off Eastern Bypass, Nairobi.

High-Quality Manufacturers



Safety Boots

Increase in Production	Increase of Recovery	Increase of OHS
Neutral	Neutral	Very Strong
Availability	Costs	Maintenance
3 days	\$10- \$25	Easy



What is it used for, and how does it work?

These are shoes with a heavy metal plate in front, majorly to prevent toe damage by heavy falling objects. They are heavy duty shoes with metal guard/ steel-cap toes and an anti-static mid-sole and ankle guards. These additional features ensure the feet are exposed to zero hazards.

How to maintain

Safety boots should be worn with heavy cotton socks. This majorly provides for sweat absorption, given the fact that the user will wear it for more extended periods. Ensure cleaning is done after wear. Check for leaks and mend as appropriate.

Availability

Due to the uptake in Occupation, Safety and health recommendations regulations and enforcement, many sectors, including construction, have contributed to an influx in safety dealers, and Local manufacturers and distributors.

Standard Technical Specifications

Shoe sizes 4-10

Steel Cap reinforced

Rubber sole and leather lining

Warranty

Usually 1-year warranty

Known Vendors

Company name: Safesol Kenya Ltd

Email address: sales2@safesol.co.ke

Contacts number: +254720030611(Chris)

Website: <https://safesol.co.ke/>

Physical Location: Nand Plaza, Hola Road - Off Baricho Road, Behind CARREFOUR MEGA

Company Name: Trapoz Ltd Kenya

Email Address: info@trapozcontractors.co.ke

Contact numbers: +254720543880

Physical location: Mandera Road, Killeleshwa, Nairobi.

Overalls

Increase in Production	Increase of Recovery	Increase of OHS
Neutral	Neutral	Very Strong
Availability	Costs	Maintenance
3 days	\$20- \$30	Easy



What is it used for, and how does it work?

Improved Visibility — Be Visible Be Seen is not a slogan only to be used in road safety initiatives. Higher-visibility gear is also important at the Mine and especially when dealing with traffic at the mining site. Bright colours and retro-reflective strips are common on quality equipment and make workers more visible to others such as motorists, truck drivers and even pedestrians.

How to maintain

Overalls should be worn properly without any loose hanging during operations, always wash your overall to be clean as much as possible, fix any work out reflector strips which helps during dark working areas.

Availability

Due to the uptake in Occupation, Safety and health recommendations regulations and enforcement, many sectors, including construction, have contributed to an influx in safety dealers, and Local manufacturers and distributors.

Standard Technical Specifications

Reflector strip
Cotton Made Overalls

Warranty

Usually 1-year warranty

Known Vendors

Company name: Safesol Kenya Ltd
Email address: sales2@safesol.co.ke
Contacts number: +254720030611(Chris)
Website: <https://safesol.co.ke/>
Physical Location: Nand Plaza, Hola Road - Off Baricho Road, Behind CARREFOUR MEGA

Company Name: Trapoz Ltd Kenya
Email Address: info@trapozcontractors.co.ke
Contact numbers: +254720543880
Physical location: Mandera Road, Killeleshwa, Nairobi.

Nose Masks

Increase in Production	Increase of Recovery	Increase of OHS
Neutral	Neutral	Very Strong

Availability	Costs	Maintenance
3 days	\$1- \$5	Easy



What is it used for, and how does it work?

They are used to cover Miner's nose during mining operations such as drilling, Blasting, Chemical fumes operations and standard dust during the working period, whether underground or surface.

They are made up of easy-wearing mechanism, two rubber strips which hold in each side of the ears to enable the mask fully cover the nose.

How to maintain

During operations, it is advisable for the Miner to fully cover the nose, ensure that the covering is neither too tight nor too loose, this can be done through a steel cap just above the mask, folded to take the shape of the nose. You should keep away from touching the mask to keep it clean for longer usability, Never wash a mask, when dirty enough please dispose and use another one.

Availability

Masks are available in safety shops, and of different varieties, Some masks are lighter and quickly disposable than others, Due to the uptake in Occupation, Safety and health recommendations regulations and enforcement, many sectors including construction have contributed to an influx in safety dealers, Local manufacturers and distributors for safety masks.

Standard Technical Specifications

Model: 3M

Usability: Disposable when dirty.

Warranty

No warranty

Known Vendors

Company name: Safesol Kenya Ltd

Email address: sales2@safesol.co.ke

Contacts number: +254720030611(Chris)

Website: <https://safesol.co.ke/>

Physical Location: Nand Plaza, Hola Road - Off Baricho Road, Behind CARREFOUR MEGA

Company Name: Trapoz Ltd Kenya

Email Address: info@trapozcontractors.co.ke

Contact numbers: +254720543880

Physical location: Mander Road, Killeleshwa, Nairobi.

Ear Plugs/Masks

Increase in Production	Increase of Recovery	Increase of OHS
Neutral	Neutral	Very Strong

Availability	Costs	Maintenance
3 days	\$15- \$30	Easy



What is it used for, and how does it work?

They protect the ears against potential hearing damage resulting from loud sounds. Excessive noise and loud bangs produced during blasting can lead to degenerative hearing and eventual hearing loss.

Fit earmuffs to the Industrial Safety Helmet as per the instructions supplied. Position the earmuff cups at the bottom of the slots in the arm. Fit helmet on head and tighten to ensure the correct fit. Adjust cups until comfortably seated over each ear.

How to maintain

Clean and disinfect with a warm soapy water cup, cushion headband. Dry with a soft cloth. Never use solvents, abrasive, obnoxious products. They may be adversely affected by certain chemical substances. Further information should be sought from the manufacturer. In normal use, these earmuffs will remain effective for 2 to 3 years after their initial use.

Replace foam inserts and cushions at least twice a year for hygiene and safety. Place the glossy side of the foam against the cup

Availability

Earmuffs/Masks/Plugs are available in safety shops and of different varieties. They also vary in quality and the nature of mining noise they are needed for.

Standard Technical Specifications

Model: NRR 28/29

Usability: Up to 2yrs.

Known Vendors

Company name: Safesol Kenya Ltd

Email address: sales2@safesol.co.ke

Contacts number: +254720030611(Chris)

Website: <https://safesol.co.ke/>

Physical Location: Nand Plaza, Hola Road - Off Baricho Road, Behind CARREFOUR MEGA

Company Name: Trapoz Ltd Kenya

Email Address: info@trapozcontractors.co.ke

Contact numbers: +254720543880

Physical location: Mander Road, Killeleshwa, Nairobi.

Eyeglasses and Googles

Increase in Production	Increase of Recovery	Increase of OHS
Neutral	Neutral	Very Strong

Availability	Costs	Maintenance
3 days	\$10- \$20	Easy



What is it used for, and how does it work?

Miners need safety glasses or spectacles. Safety spectacles fitted with side shields offer suitable protection against dust, kicked-up pebbles, and pieces of metal. Such dirt and debris can be extremely harmful if it meets the eye at a high velocity. Goggles are barely worn underground except in situations where there are dangerous operations that could lead to chemical splashes.

How to maintain

Always keep the glasses clear when working, ensure that they fit well in your eyes, as one is tempted to remove the glasses during work or in time of poor visibility, it is dangerous especially during flying pebbles.

Availability

Eyeglasses are available in safety shops and there is no need to import unless when buying in bulk, please select the right glasses that your mine staffs will be comfortable to wear.

Standard Technical Specifications

Model: EN166 Personal wear

Usability: Up 3 yrs.

Known Vendors

Company name: Safesol Kenya Ltd

Email address: sales2@safesol.co.ke

Contacts number: +254720030611(Chris)

Website: <https://safesol.co.ke/>

Physical Location: Nand Plaza, Hola Road - Off Baricho Road, Behind CARREFOUR MEGA

Company Name: Trapoz Ltd Kenya

Email Address: info@trapozcontractors.co.ke

Contact numbers: +254720543880

Physical location: Mandera Road, Killeleshwa, Nairobi.



Hand Gloves

Increase in Production	Increase of Recovery	Increase of OHS
Neutral	Neutral	Very Strong
Availability	Costs	Maintenance
3 days	\$5- \$15	Easy



What is it used for, and how does it work?

Pavement and ground will mangle unprotected hands. Gloves are specifically designed for the mining activity performed. Commonly made of leather, corduroy, or Kevlar, or some combination. Some include carbon fibre knuckle protection or other forms of rigid padding. Some gloves also provide protection to the wrist.

How to maintain

Always wash your gloves and keep them clean, replace badly worn out Gloves and ensure to remove them as soon as you are out for the Mine, never use them while eating.

Availability

Hand Gloves Eyeglasses are available in safety shops, and there is no need to import unless when buying in bulk, please select the right-hand glove suitable for specific mine operation.

Standard Technical Specifications

Size: 9" with 2."

Colour: Dark blue/ Black

Dots: soft rubber

Weight: 70 grams per pair (Approx.)

Known Vendors

Company name: Safesol Kenya Ltd

Email address: sales2@safesol.co.ke

Contacts number: +254720030611(Chris)

Website: <https://safesol.co.ke/>

Physical Location: Nand Plaza, Hola Road - Off Baricho Road, Behind CARREFOUR MEGA

Company Name: Trapoz Ltd Kenya

Email Address: info@trapozcontractors.co.ke

Contact numbers: +254720543880

Physical location: Mandera Road, Killeleshwa, Nairobi.



Helmet

Increase in Production	Increase of Recovery	Increase of OHS
Neutral	Neutral	Very Strong

Availability	Costs	Maintenance
3 days	\$15- \$50	Easy



What is it used for, and how does it work?

Helmets are used for the optimal protection of the head area

The mining protection hats should be full brimmed while the caps should feature a front peak. Such features are critical in extremely wet mines to allow the easy shedding off the water.

The hats should have side slots for mounting accessories such as flashlights, hearing protection, and face shields.

How to maintain

Always wash your gloves and keep them clean, replace badly worn out Gloves and ensure to remove them as soon as you are out for the Mine, never use them while eating.

Availability

Helmets are locally available in safety shops, and there is no need to import unless when buying in bulk, please select the right helmet suitable for specific mine operation.

Standard Technical Specifications

Model: EN397 Standard EPS Foam for Extra Impact Strength

OSHA Approved for Jobsite

Known Vendors

Company name: Safesol Kenya Ltd

Email address: sales2@safesol.co.ke

Contacts number: +254720030611(Chris)

Website: <https://safesol.co.ke/>

Physical Location: Nand Plaza, Hola Road - Off Baricho Road, Behind CARREFOUR MEGA

Company Name: Trapoz Ltd Kenya

Email Address: info@trapozcontractors.co.ke

Contact numbers: +254720543880

Physical location: Mandera Road, Killeleshwa, Nairobi.

High-Quality Manufacturers For Safety Equipment

