

MSA Safety Solutions

for Mining Activities



*Because every life has a **purpose...***



Protecting miners **since 1914**

MSA is the world's leading innovator and provider of high-quality safety products and gas detection system solutions protecting lives and improving the health and safety of thousands of men and women each and every day.

With help from Thomas Edison, MSA developed its first product for miners – a flameless electric cap lamp to help prevent methane-related explosions caused by open flame lamps.

Today, our comprehensive product portfolio ranges from simple to complex high-tech solutions. The great breadth of technologies, products and services we offer is unique to the market. Our products are designed to ensure the integrated system compatibility of individual safety and gas detection products.

With manufacturing operations on five continents and with more than 40 locations worldwide, we provide the most innovative and advanced safety solutions to meet the toughest demands of mining and other industries. Our customer base includes the biggest mining companies specialising in exploration and mining in South America, South Africa, United States, Canada and Australia.



Making mining workplace **better and safer**

Mining is a high-risk industry and one of the most challenging when it comes to protecting the health and safety of workers. Whether surface or underground, mining involves working in potentially hazardous conditions and encompasses use of heavy machinery and tools that are potentially perilous. Working in mines and carrying out mining tasks exposes a worker to risks, such as: explosions, fires, noise induced hearing loss, respiratory disease, rock fall, slips or trips, falls from heights, mobile equipment accidents and more.

Miners working in harsh weather conditions, dark tunnels, blind spots, contaminated or low-oxygen environments are especially exposed to various physical, chemical, mechanical and biological risk factors. To minimise the risks and ensure safety of workers, the use of proper personal protective equipment and ambient air monitoring instruments are essential.

Mining disasters still happen and can occur under a variety of circumstances. Every incident will provide different and at times unique challenges to miners and people in charge of control and management of the situation. Incident teams rely on advanced personal protective equipment and accurate and reliable portable gas instruments for area inspection. An emergency event can rapidly escalate depending on the dynamic nature of the situation. MSA personal protective equipment helps to mitigate risks and prevent further accidents. Due to the harsh environments in which emergency teams need to use their equipment the high quality of MSA products and innovative solutions are the key factors for safe and successful actions.

MSA's expertise in miners' protection is visible throughout its wide range of safety solutions covering head, eye, face, hearing, respiratory, fall protection to reliable portable gas detection instruments. MSA products meet local and international standards and are developed to ensure the highest safety requirements. Our goal is to make mining workplace better and safer.



Underground Mining

Applications	Risks	MSA Solutions
Development and installation of roof support systems	Falling objects, impacts, dust, combustible and toxic gases, oxygen deficiency	Head protection, eye protection, portable multigas detectors, respirators
Minerals exploration, drilling, crushing, cutting, scaling of coal and ore	Dust, impacts, flying particles, noise	Hearing protection, head protection, eye protection, respirators
Use of underground vehicles, machinery and power tools	High ambient noise, falling objects, falls from vehicles	Head protection, hearing protection, fall protection
Operations with diesel powered machine	Toxic diesel exhaust	Portable multigas detectors, respirators
Working with electrical transport systems	Electrical shocks, dust	Head protection, face protection, respirators
Routine environmental monitoring. Confined space entry for testing	Coal dust, combustible gas, oxygen deficiency, toxic gases (CO, CO ₂ , H ₂ S, NO ₂), falls	Portable multigas detectors, respirators, fall protection
Escape from the mine. Long route escapes	Unbreathable atmosphere, carbon monoxide, smoke, toxic contaminants	Self-rescuers with oxygen generation

Surface Mining

Applications	Risks	MSA Solutions
Preparation. Removal of top soil	Chips, projectiles, UV radiation	Head, eye, face, hearing protection
Construction of roadways	Mechanical impacts, electrical shocks, noise	Head protection, eye protection, hearing protection
Drilling and crushing the rocks. Digging and scrapping	Falls, dust, projectiles, noise	Fall protection, respirators, head, eye, face, hearing protection
Using explosives for blasting. Handling chemical materials	Flying objects, toxic and explosive gases, noise	Head, eye, face, hearing protection, portable multigas detectors, respirators
Examination of face and quarry stability	Impacts, falling objects, UV radiation, falls	Head protection, eye protection, fall protection
Loading of extracted minerals	Falling objects, electrical shocks, dust, noise, projectiles	Head, eye, face, hearing protection, respirators
Transporting of ore for further operations	Impacts, noise, dust	Head protection, hearing protection, disposable respirators, eye protection

Processing Operations

Applications	Risks	MSA Solutions
Processing of minerals by crushing, grinding and screening	Noise, dust, flying particles	Head protection, face protection, hearing protection, respirators, eye protection
Cutting, chipping or scaling of ore	Weld spatter, grinding residues, flying objects, dust	Face protection, respirators, eye protection
Welding, flame cutting, use of solvents, handling of fuels	Dust, mists, fumes, organic vapours, toxic acid gases, falls	Disposable respirators, portable multigas detectors, fall protection, face protection, eye protection
Water sprays to suppress the dust	Water droplets, silt, dust	Respirators, head protection
Separation of precious minerals from ordinary rock. Separation of metals from their ores	Toxic fumes, toxic gas exposure (SO ₂ , HCN)	Portable multigas detectors, respirators
Process check, adjustment and maintenance	Dust, falls from height, noise	Respirators, head protection, hearing protection, fall protection, face protection

Head Protection



Head protection is mandatory in the mining industry where restricted headroom, falling objects or working at dangerous heights pose a risk of serious injury.

The MSA V-Gard range includes high quality **safety helmets** suited for various mining applications. In combination with a unique system of accessories, V-Gard helmets provide safety for the head and protection of eyes and ears. Each helmet can be equipped with a plastic or metal front lamp bracket to permit mounting of a miner's cap lamp and other accessories including helmet-mounted ear muffs, reflective stickers, chinstraps, face shields etc.

Knowing the challenging working conditions miners face daily, one of the MSA's top priorities is providing technology-driven, high-quality head protection products to ensure health and safety of each worker.



V-Gard and V-Gard 500 Helmets

Safety helmets featuring unique product design

- Moulded from UV stabilised HDPE or ABS
- 2 options of textile 4-point suspensions: Staz-On and Fas-Trac
- Antistatic, tested to EN13463-1 (ATEX)
- Available in vented or non-vented configurations
- For applications -50°C to +50°C
- V-Gard 500 provides lateral crushing protection
- Wide colour range (up to 10 colours)
- Rain gutter available on V-Gard 500 to protect against liquids



V-Gard Options and Accessories

Additional safety for your eyes, face and hearing

- Plastic and metal front lamp bracket, both equipped with rear loop to hold the mounted lamp cable
- Integrated Stow-Away clear spectacles
- Wide range of visors to protect your eyes and face in 3 thicknesses, 2 widths and 3 distinct lengths, flat and moulded
- 2pt or 3pt chinstraps
- Retro-reflective stickers to increase your visibility in dark conditions



F2 X-TREM Helmet

A high performance helmet designed for mining rescue teams

- Vented shell made of thermal resistant polyamide
- Comfort headband covered with soft leather and patented ratchet quick adjustment system with 3- point chinstrap for safe fit
- Integrated mounting points for visors, goggles, hearing protectors, communication systems, respiratory masks, lamps, neck curtains and visors
- Available in numerous colours



V-Gard accessory system offers complete solutions to protect your face, eyes, neck and chin.

Frames, visors and chin protectors have been designed and tested as a system with our helmets to ensure product compatibility, a crucial component of compliance and safety.

MSA has developed a wide range of **visors and frames** to cover the needs of most industrial applications. Each part of the accessory system is equipped with a unique 3 point visor/frame connection which makes it easy to use and maintain products. Our frames and visors are adaptable to all MSA safety helmets and offer a large variety of combinations. For demanding applications you can extend the protection by connecting dedicated chinguards and debris control to MSA's high quality range of accessories.

Standard Frame

Frame for various MSA helmets designed to integrate with other accessories

- Slot adapters compatible with all MSA helmets included in each frame package
- Can be easily fitted to work with earmuffs
- Standard frame contains no metal parts
- Replaceable debris control creates a tight seal between helmet and frame reducing potential ingress of contaminants such as dust or waste
- Sloped design makes it easy to clean the frame as rubbish just slides off the frame



Mesh Visors

Maximum ventilation in humid working conditions

- Optimised face coverage: length 203 mm x width 432 mm
- Durable, epoxy-coated 20 x 20 steel mesh, bound with heavy-duty plastic
- Meets requirements for EN 1731-F (impact: 45m/s)



Polycarbonate and Propionate Visors

Wide range of transparent visors fitting every application

- Flat and moulded visors: flat visors are cut from sheet stock and formed around the visor frame.
- Moulded visors are individually injection moulded allowing for greater accuracy in optical properties and reducing the inherent stress once the visor is mounted to the frame
- Visor versions with anti-fog and anti-scratch coating available
- A variety of sizes and thicknesses
- Specific shaping to integrate with hearing protection

Chin Protectors

Extends protection covering under the chin area

- Opaque material ensures safety and standards compliance with V-Gard visors
- Provide extra protection from impact and splash hazards to face and neck
- Unique retractable version available to allow greater flexibility of head movement both up and down, as well as side to side



Eye Protection



Mining involves breaking the rock or removing soil. Dust and pebbles generated during these activities may get into the eyes when poorly protected, interfering with vision and causing accidents.

MSA offers **eyewear protection** solutions that range from safety spectacles, goggles to face shields, depending on the operations being performed and the combination of hazards to which the miner is exposed. As the dust and dirt in many mining environments can be highly abrasive, all MSA protective eyewear features impact resistant lenses with outstanding anti-scratch properties and anti-fog coating to ensure the best choice for abrasive mining environments. For operations that pose the danger of chemical splash goggles can be the most suitable safety solution.



Racers

Utmost impact protection in its best style

- Very high impact resistant single lens (198 m/s), compliant to military standards
- Formable wire temples adapt to different head sizes and provide a comfortable fit
- Adjustable soft nose buds for perfect fit on different nose shapes



Altimeter

Hybrid design for universal use

- Comes with a comfortable headband or length adjustable soft temples
- Soft frame for complete eye enclosure and superior shock absorption
- Ventilation slits to ensure a comfortable and airy fit



PERSPECTA 1320

Multi-adjustable, for universal use

- Full wrap around with curved polycarbonate lens providing an undistorted 180° view
- 3 position ratchet for lens inclination adjustment and 3 positions for temple length adjustment



PERSPECTA 9000

Extremely lightweight and snug-fitting spectacle for all day wear

- Revolutionary hard and soft co-injected temple for improved comfort
- Sightgard coating: MSA's popular anti-fog coating with good anti-scratch properties
- Optional TuffStuff coating: anti-scratch according to EN 166, "K"



PERSPECTA GIV2300

A new dimension in style and comfort

- Flexible body that adapts perfectly to the individual contours of the face
- Panorama anti-fog lens, impact-resistant at extreme temperatures
- 11 indirect air vents provide good circulation while protecting against splash and dust



Eyewear Accessories

Practical extras to increase comfort of eyewear usage

- Cleaning and anti-mist solutions to remove oil or grease stains from your eyewear
- Neck cords with adjustable ends fitting all spectacles
- Practical spectacle cases, available in soft or rigid material for all spectacles



Underground vehicles, machinery and power tools generate high ambient noise levels which can affect hearing ability and create long-term damage to hearing.

MSA provides various types of **ear muff protectors** which are slot-mounted on the miner's cap as well as disposable or reusable ear plugs in corded or non-corded version, depending on the operations being performed and the noise level to which the miner is exposed.

HPE, EXC, XLS

Classic Line hearing protection – comfortable and affordable

- Available as helmet mounted or with a headband for stand-alone use
- Wide headband for lower pressure and comfortable fit
- Three wearing positions for helmet mounted version
- Two point mounting system with firm grip for easy handling
- Moulded inserts provide large space inside the cup
- Contoured cushions for better seal



left/RIGHT

Innovative and unique hearing protection - cups designed for left and right ear

- Unique headband design for a better fit
- Cups shaped to follow the head form
- Large muff providing more space for the outer ear
- Improved comfort and protection
- Three attenuation levels, four colors
- Passive and electronic, headband and helmet mounted versions



Respiratory Protection



Exposure to harmful fumes, dust and work for long periods of time in unhealthy, dusted and often toxic environment requires the highest standard of respiratory equipment. The most commonly needed respiratory protection in mining operations is dust protection. Exposure to rock dusts, including coal dust and silicon dust can cause long-term lung problems. In addition, the storage and transport of chemicals within the mining area and between mines can cause harm to workers if not handled properly. Smoke or fumes from smelters affect air quality and thus cause respiratory problems.

MSA's versatile range of **air-purifying respirators** includes disposable respirators, half masks, full face masks, and respiratory filters that provide effective breathing protection with unparalleled comfort and ease of use.

Affinity 1100 and 2100

Protect against penetrating solid and liquid aerosol particles, depending on which class of filter is used

- Thin and light material for comfortable fit
- Anthropological vertical low profile design
- Optional exhalation valve
- Pre-shaped nose clip
- Colour coding for quick identification
- High filter media quality provides 5 years storage life
- Available in FFP1, FFP2 and FFP3 versions according to EN 149:2001 + A1:2009



Affinity 1100 series
cup-shaped respirator



Affinity 2100 series
folded respirator



Advantage 200 LS

Comfortable, efficient and economic half mask respirator

- Low weight, well-balanced design for high wearing comfort
- Multi-ethnic face seal for precise fit
- Easy to clean, low-maintenance design
- Wide range of light weight, high-performance bayonet Advantage filters, TabTec® and FLEXIfilter for various applications



Advantage 400

User-friendly and durable half-mask respirator for extensive use

- Drop-down and lock-down option with unique harness assembly
- Multi-ethnic face seal for precise fit and maximum safety
- Choice of single thread and bayonet twin filter connections
- Only 3 major components for low maintenance and cost-effectiveness



Advantage 3000

High-quality full face mask series available in different versions and sizes

- Patented, pre-adjustable head harness for consistent fit
- Wide, optically corrected lens to avoid distortions in the field of vision
- Deep chin cup for better stability and more comfort
- Choice of single EN 148 standard thread or twin Advantage bayonet filters



Self-contained rescue devices are necessary when it comes to unexpected hazardous events in underground mining. The comprehensive range of MSA oxygen self-rescuers are used to help miners to escape from the mine in the event of a mine fire, explosion, oxygen deficient or toxic atmosphere.

MSA's self-rescuers are designed to be carried on a belt or shoulder strap and donned in seconds. The breathing air regeneration based on the KO₂ technique will supply oxygen to the wearer during his escape or while waiting for rescue, always self-adjusting to the oxygen demand of the user. Donning and use can easily and economically be practiced with the training units, without consuming a chemical canister.

SSR 30/100

Small and robust respiratory protective device employs the well-known and worldwide proven principle of generating oxygen chemically

- 20 minutes duration time at 35 l/min (according EN 13794)
- Fast donning procedure
- Stainless steel sturdy container design
- Carried on belt or chest
- 10-year storage and service life
- Oxygen supply according to demand
- Largely maintenance free



SavOx

Self-contained respiratory protective escape device for protection against toxic gases, particles or oxygen deficiency

- 30 minute duration time at 35l/min
- Small, light and robust packed in stainless steel container
- Designed to be carried on a belt
- Has automatic starter system and readiness indicator window
- 10 year storage and service life
- Safety goggles for eye protection included



SSR 90

The SSR 90 is a chemical oxygen apparatus that supplies the user with oxygen generated from a chemical (KO₂)

- 60 minute duration time at 35 l/min
- Robust stainless steel case
- Oxygen supply according to demand
- Low maintenance
- Simple handling



Fall Protection



Slips, and falls from elevation are common cause of accidents in the mining industry and may result in permanent disability or death. To protect miners against fall, a **full body harness** is strongly recommended.

For miners working in the shafts, over crushers or near open sump or pits, a harness with a suitable **lanyard and shock absorbing device** should be the most appropriate solution. Additional D-rings may be added to a harness or a miner's belt for work positioning or to restrict movement within safe limits.

MSA's extensive product range includes textiles, such as the innovative EVOTECH and MSA Workman lines of product, and a selection of hard goods, including self-retracting lanyards and confined space equipment.



MSA Workman Premier

Comfortable vest-style harness with back D-ring and an additional attachment point at the front, with extra adjusters on the torso for even greater ease of adjustment

- Colour contrasting thigh and torso straps simplify donning
- Integral load indicator alerts you when the harness has been involved in a fall event
- Shoulder loops for use with the MSA Spreader Bar



MSA Workman Utility

Multi-purpose fall protection harness that offers front and rear fall arrest attachment points, positioning belt and back-pad

- With removable belt for easy fitting of tool pouches
- Attachment loops on the shoulders for confined space entry and retrieval applications with spreader bar use
- Yellow/black webbing for increased visibility



EVOTECH

Designed for all day use from the most demanding of users

- Breathable padding with moisture-wicking material
- Built-in RFID chip lets you easily track and inspect harness
- NanoSphere® coating on webbing repels dirt, grease, moisture, and more
- Reflective piping increases visibility in low-light environments

MSA Workman Restraint Lanyards

Primarily used for travel restriction

- Available in web, kernmantel or wire rope configurations with a variety of connectors
- Adjustable or fix lengths





MSA Workman Energy-Absorbing Lanyards

The MSA Workman energy-absorbing lanyards are available in web or kernmantel rope configurations with a variety of connectors

- Includes a clear, durable protective cover over the labels to increase service life and allows for easy inspection
- Available in 1.5 or 2m lengths, adjustable or fixed
- Choice of single or twin-leg configurations



Sure-Stop EN Lanyards

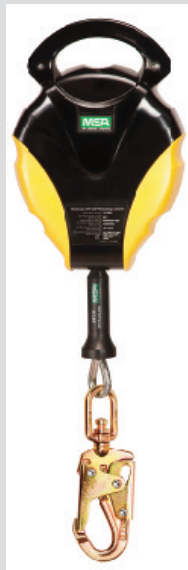
A choice of high-strength web, rope, or cable models with a compact, tear-tape energy absorber design

- Single-leg and twin-leg models
- Fixed and adjustable lengths
- Lanyards made of Monster Edge webbing with 53 kN minimum breaking strength

MSA Workman SRL

Lightweight design, durable thermoplastic housing and impact-absorbing bumpers

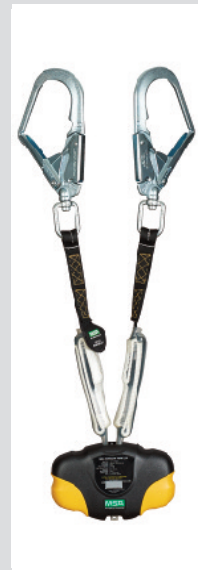
- Integral, ergonomic carrying handle for easier transport and installation
- RFID-enabled product for simplified product tracking and inspection
- 136 kg working capacity for increased versatility
- With galvanised or stainless cable, 9 or 15m



MSA Workman Twin Leg PFL

Designed to help workers who required 100% tie-off and low maximum fall distance

- Incorporates two legs to provide the user with the ability to be continually tie-off and also retracts to help prevent trip hazards
- ARCA™ Harness Connection connects in seconds
- RFID-enabled for simplified easy tracking of device



Anchorage Connectors

A wide selection of anchorage connectors made of polyester, nylon or galvanized cable

- Quick and easy to install
- Durable polyester or nylon webbing
- Vinyl coated galvanised cable



Portable Gas Detection



Presence of combustible gases and oxygen deficiency are the main gas risks the miners are exposed to during their daily work. Coal dust and methane gas explosions in underground coal mines remain a serious risk requiring comprehensive monitoring and management. Some underground coal mines require monitoring of carbon dioxide and hydrogen sulfide gas. MSA offers a well suited line of **portable gas detection instruments** providing early warning where there is a risk of explosion, reduced oxygen content or exposure to toxic gas.

The real strength of our multigas detectors comes from our sensor technology. **MSA XCell sensors** have a typical life of more than double the industry average, and are engineered using MSA's proprietary application-specific integrated circuit (ASIC) design. By miniaturising the sensors' controlling electronics and placing them inside the sensor itself, MSA XCell sensors offer superior stability, accuracy, and fast response and calibration times. But most importantly, in extreme mining environment, saving seconds on response time can also mean saving lives.



ALTAIR® 4X

4-gas instrument powered by fast MSA XCell® sensor family for LEL, O₂, CO, H₂S, SO₂, NO₂ and with exceptional 24h battery run time

- 4-year expected sensor life means less money spent on replacement sensors and replacement instruments
- Industry-exclusive end-of-sensor-life warning; save money by reducing instrument downtime and sensor inventory
- MotionAlert™ and InstantAlert™ alarms provide early warning, giving workers additional ways to call for help and send a warning
- Extended temperature range: -40°C to +60°C. Greater signal stability and repeatability under changing or extreme environmental conditions
- Withstand 6 m drop, IP 67 rating. Rely on the ALTAIR® 4X detector performance without worrying about breaking a "delicate" instrument
- Lasting durability proven by full 3-year warranty which covers the entire detector, including the sensors and battery



ALTAIR® 5X

Multigas instrument for detection of up to 6 gases with field proven integral pump and 18 hours battery run time. Ideal for emergency mining teams

- Industry-leading accuracy, repeatability, and response times in under 15 seconds for the most common configurations with XCell sensors. Typically greater than 4-year sensor life time.
- All XCell sensors are capable of plug-and-play capabilities for easy reconfiguration
- Integrated safety features including MotionAlert™ - "man-down" and InstantAlert™ - manual alarm - Ideal for confined space applications when there is no direct line of sight
- Multilingual optional colour display with possibility of customer logo implementation
- A rugged polycarbonate IP65 rated housing provides unsurpassed durability, including the ability to survive a 3 m drop
- 3-year instrument warranty covering battery and entire detector configured with LEL, O₂, CO, H₂S, SO₂ and IR sensors

XCell® Sensor Technology

Building on years of design experience, MSA revolutionises sensor technology with breakthroughs that improve mining application performance. Digital sensors offer increased RF (radio frequency) immunity which eliminate false alarms from radios

- EX-M sensor – providing additional stability for extended methane exposure
- CO/NO₂ sensor* – industry-leading response time for common exhaust gases
- O₂ sensor – lead-free, unique design with superior immunity to pressure spikes
- CO/H₂S sensor – accurate and durable for combustion and metal mining toxic gases

(* available as dual-tox XCell sensor in ALTAIR 4X)



GALAXY® GX2

Easy-to-use automated calibration and test system for ALTAIR Family gas detectors

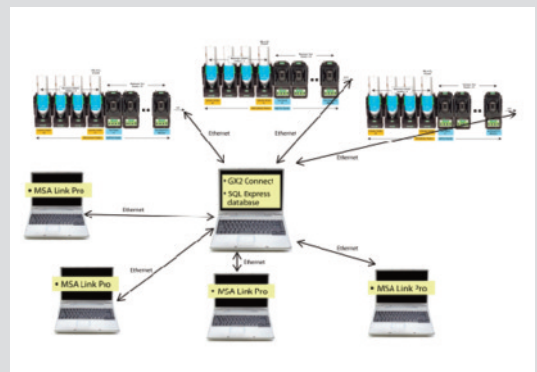
- High performance as either a stand-alone unit or an integrated portable detector management system, enabling total data access and control of the MSA ALTAIR gas detector fleet
- Once any ALTAIR Family gas detector is placed within the GALAXY GX2 system, it can be tested, calibrated and charged automatically
- Flexibility allowing for up to 10 test stations, 4 cylinder holders and multi-unit charger within one GALAXY GX2 system detector bank
- Colour touch screen with 18 languages, enhances user experience at the test stand allows easy set-up. Simple use with touch-free testing



MSA Link Pro

Advanced software for GALAXY GX2 system management which offers efficient set-up and configuration

- Dashboard with real live system view. Single-glance notification of instruments that are overdue for calibration or bump test
- Reports that allow viewing the data at your convenience. Database storage of instrument periodic and session data logs and customisable reports
- Email notifications of GALAXY GX2 system, instrument warnings and error messages
- Professional fleet management lets you to configure banks, instruments and audit fleet settings





Trust and Durability

For nearly 100 years our passionate mission of safety has empowered us, “The Safety Company”, to protect lives.

We are committed to providing the latest in innovative, best-in-class safety solutions that feature integrated systems capability and allow our customers to return safely to their families and friends.

Every day our customers place their lives in our hands. In response, we provide them with protection they can trust and their stories become our stories. Hand in hand, we partner with our customers to earn that trust.

At MSA, every life has a purpose.

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