



2015 Welding Safety & Health Guide

HEAD & FACE | HAND & BODY | HEAT STRESS | RESPIRATORY | FUME EXTRACTION



MillerWelds.com



Miller Welding Safety & Health

All of our products are designed and built to protect the welder behind the hood and the environment in which they perform their job duties everyday – because that’s what we know. By listening to welders and working with them side-by-side, we understand their pain points and have developed products that protect workers from the unique physical dangers and health risks prevalent within their work environments. The safety and health of your workers and your environment is critical to productivity, performance, and hiring and retaining the best employees.

Visit MillerWelds.com to learn more!



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Fume Extraction & Respiratory Protection

Providing a safe, healthy and compliant work environment doesn't need to be complicated. Miller is the only single-source solution for welding fume control products that fulfill each tier of OSHA's hierarchy of controls, making it easier to keep your environment in compliance and your workers on the job.

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The Talk: Terms and definitions used in this section

OSHA: Occupational Safety & Health Administration; federal agency responsible for setting and enforcing standards, providing training, outreach, education and assistance.

Permissible Exposure Limit (PEL): Enforceable regulatory limits on the amount or concentration of a substance in the air, established by OSHA.

Time Weighted Average (TWA): Average value of exposure on the basis of an 8h/day, 40h/week work schedule.

Ceiling Limit (C): Absolute exposure limit that should not be exceeded at any time.

ACGIH®: American Congress of Governmental Industrial Hygienists; a member-based organization that develops recommendations or guidelines to assist in the control of occupational health hazards.

ACGIH Threshold Limit Value (TLV®): Limits on the concentration of a substance in the air, typically for inhalation or skin exposure.

NIOSH: National Institute of Occupational Safety and Health; federal agency that conducts research and makes recommendations to prevent worker injury and illness as well as certifies respirators.

Recommended Exposure Limits (REL): Occupational exposure limits recommended by NIOSH to OSHA for adoption.

EPA: Environmental Protection Agency; federal agency that focuses on protecting human health and the environment by writing and enforcing regulations based on laws passed by Congress.

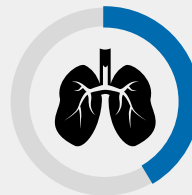
NESHAP: National Emissions Standards for Hazardous Air Pollutants set by the EPA; controls what manufacturers emit out of their shops.

Statistics & Trends: Fume Extraction & Respiratory



#4-Respiratory Protection

OSHA's 2014 Top Ten Most Cited Violations
The section cited most often within this category is 1910.134(c)(1) - Establishing and implementing a written respiratory protection program.¹



30-40%

Long-term welders face a 30 to 40 percent increased risk of lung cancer due to exposure to fumes that may contain nickel, hexavalent chromium, and manganese, as well as welding or cutting surfaces covered in asbestos.²

¹ Report from OSHA and Safety+Health magazine.

² James M. Antonini, "Health Effects of Welding." Critical Reviews in Toxicology. Vol. 33, No. 1 (2003), pp. 61-103.

Are Welding Fumes an Issue in Your Environment?

It's critical to understand if exposure to airborne contaminants are putting your workers and facility at risk. If exposure levels reach OSHA PELs, or other applicable government occupational exposure limits, whichever is lower, there are methods to reduce potential hazards, protect workers' health and ensure compliance.

Know Your Hazard

Dusts & Fibers: Solid particles that are formed or generated from solid materials through mechanical processes such as crushing, grinding, drilling, abrading or blasting. Examples are lead, silica, and asbestos.

Fumes: Solid particles that are formed when a metal or other solid vaporizes and the molecules condense (or solidify) in cool air. Examples are metal fumes from smelting or welding.

Mists: Tiny droplets of liquid suspended in the air. Examples are oil mists produced from lubricants used in metal cutting operations.

Gases: Materials that exist as individual molecules in the air at room temperature. Examples are welding gases, such as acetylene and nitrogen, and carbon monoxide produced from internal combustion engines.

Vapors: Gaseous form of substances that are formed by evaporation. They are normally in the solid or liquid state at room temperature and pressure. Most solvents produce vapors. Examples include toluene and methylene chloride.

Determine if Your Exposure Levels are Safe Using the Following 2-step Process

STEP 1:

Exposure Assessment

Have the air in your facility tested by a certified Industrial Hygienist to determine contaminant concentrations, ensuring exposure levels do not exceed limits as outlined in the chart below, or other applicable government occupational exposure limits, whichever is lower. To contact an Industrial Hygienist, visit www.aiha.org or call 703-849-8888.

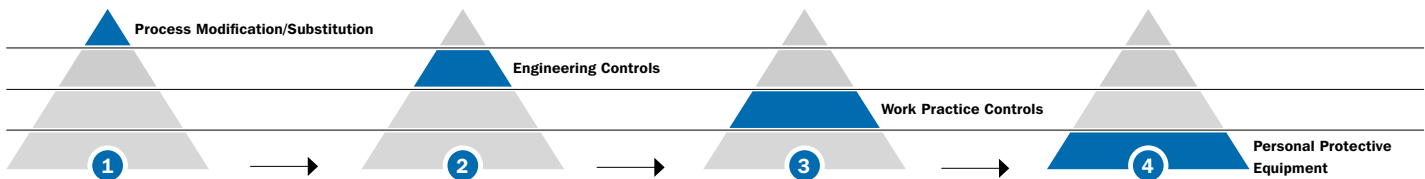
Substance	Prevalent In	Exposure Limits	
		OSHA - PEL (Enforceable) ¹	ACGIH® - TLV® (Recommended)
Hexavalent Chromium	Stainless, High Alloy Steels	5.0 ug/m ³ TWA, 2.5 ug/m ³ TWA	0.05 mg/m ³ TWA
Zinc (Zinc Oxide)	Galvanized Metal Coatings	5.0 mg/m ³ TWA	2.0 mg/m ³ TWA
Manganese	Most Welding Fumes: Electrodes & Steels	5 mg/m ³ Ceiling	0.02 mg/m ³ TWA
Aluminum	Steel Additive, Electrode Coatings	5.0 mg/m ³ TWA	1.0 mg/m ³ TWA
Nickel	Stainless, Nickel Alloys	1.0 mg/m ³ TWA	0.2 mg/m ³ TWA
Iron (Iron Oxide)	Most Welding Fumes	10.0 mg/m ³ TWA	5.0 mg/m ³ TWA
Copper	Copper Metals, Electrodes	0.1 mg/m ³ TWA	0.2 mg/m ³ TWA
Cadmium	Coatings of Electrodes	0.1 mg/m ³ TWA, 0.3 mg/m ³ Ceiling	0.1 mg/m ³ TWA
Lead	Solder, Brass & Bronze Alloys, Steel Coatings	0.05 mg/m ³ TWA, 0.03 mg/m ³ Action Level	0.05 mg/m ³ TWA
Beryllium	Copper, Magnesium & Alluminum Alloys	0.002 mg/m ³ TWA, 0.005 mg/m ³ Ceiling	0.00005 mg/m ³ TWA

STEP 2:

Determine an Action Plan

Based on air sampling results, you may need to implement control measures to manage fume exposure within your facility. Following OSHA's Hierarchy of Controls will limit the risk of worker injury and illness, providing a safer and more productive work environment.

Follow the step(s) below to reduce exposure levels and potential hazards:



**Process Modification/
Substitution:**

Miller Recommends:
Hobart® Element™ Wire,
Miller Advanced Welding
Processes and Equipment,
Miller Welding Automation

The first step in reducing exposure is to eliminate the hazard from the process, or modify the process to reduce airborne contaminants. Examples of this step include: eliminating welding operations, using low-fume welding consumables, changing to a welding process with lower fume generation or integrating automation welding, altering machine parameters and/or switching to a specialized shielding gas mix. If process modifications alone are not feasible or do not reduce exposure levels enough, continue to next step.

Engineering Controls:

Miller Recommends: FILTAIR®
Fume Extraction Systems,
Bernard® Fume Guns

Engineering controls are used to remove a hazard. Well-designed engineering controls can be highly effective in protecting workers and will sometimes be independent of worker interactions, depending on the solution chosen. Ventilation is an effective way to remove the fume at the source of generation before it reaches the welder's breathing zone. Ventilation can take the form of natural dilution ventilation, mechanical dilution ventilation or local exhaust ventilation. If engineering controls are not feasible or do not reduce exposure levels enough, continue to next step.

Work Practice Controls:

Miller Recommends:
Changes to Workplace,
Training and Education

Work practice controls include changes to workplace procedures, policies and the way people work that limit and/or prevent exposure to the hazards. Training, job scheduling and hygiene are examples of work practice controls that can be used to minimize worker exposure to welding fume. Often these controls are used in conjunction with other control measures to promote a safe work environment.

**Personal Protective
Equipment:**

Miller Recommends: Respirators

When engineering controls are not feasible, while they are being implemented, or when they are not able to reduce employee exposure below permissible levels, respiratory protection should be implemented. Disposable Respirators, Half Masks, Powered Air Purifying Respirators (PAPR) and Supplied Air Respirators (SAR) are common in welding applications.



This process requires repetitive exposure assessments. Any time there is a change to the worker, process or facility, retesting should be conducted to ensure exposure concentrations have not been affected.



Process Modification/Substitution

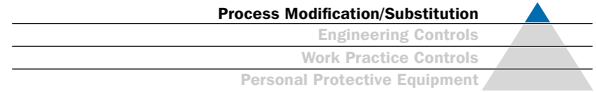
Engineering Controls

Work Practice Controls

Personal Protective Equipment

Process Modification/ Substitution

The first, and most effective level in the hierarchy of controls, removes the danger from the environment, or substitutes with something that does not produce a hazard. Hobart® Element™ filler metals address one of the leading health concerns in the industry – reducing the level of manganese in your welding environment – while maintaining the capabilities needed for industrial welding applications.



Hobart® Element™ Wire

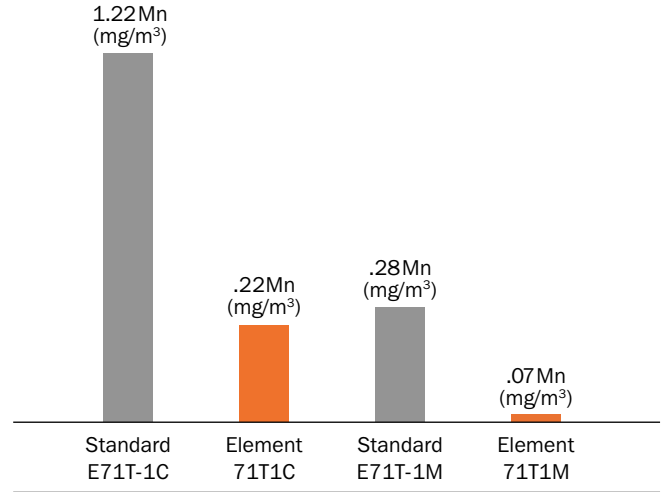
Element wire offers the most comprehensive line of filler metals in the industry that are designed to reduce manganese fume emissions in welding. Conversion to Element products may result in a 60-80% reduction in manganese levels when compared to current filler metal fume emissions.

Designed for compliance and performance, Element wire can help you meet increasingly stringent environmental regulations for the manufacturing and fabrication industries – and ensure the best operability and productivity.



Hobart Element Wire vs. Standard Wire

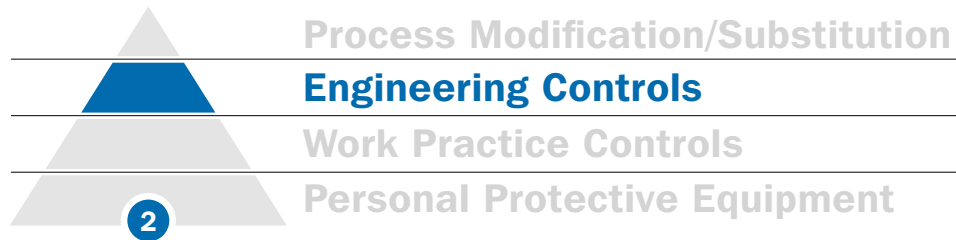
(Values based off of controlled laboratory testing. Due to the vast amount of variables involved, results may vary from application to application.)



Available Diameters and Packaging

Product	AWS Class	Diameter	Packaging	Part Number
Element™ 71T1C	E71T-1C H8, -9C H8	.045 in	33 lb Fiber Spool	S292112-029
		.052 in	33 lb Fiber Spool	S292115-029
		1/16 in	33 lb Fiber Spool	S292119-029
		1/16 in	60 lb Coil	S292119-002
Element™ 71T1M	E71T-1M H8, -9M H8	.045 in	33 lb Fiber Spool	S294112-029
		.052 in	33 lb Fiber Spool	S294115-029
		1/16 in	33 lb Fiber Spool	S294119-029
Element™ 71M1C	E71T1-GC H8	.045 in	33 lb Fiber Spool	S292212-029
		.052 in	33 lb Fiber Spool	S292215-029
		1/16 in	33 lb Fiber Spool	S292219-029
Element™ 71M1M	E71T1-GM H8	.045 in	33 lb Fiber Spool	S294212-029
		.052 in	33 lb Fiber Spool	S294215-029
		1/16 in	33 lb Fiber Spool	S294219-029
Element™ 81K2C	E81T1-GC H8	.045 in	33 lb Fiber Spool	S292412-029
		.052 in	33 lb Fiber Spool	S292415-029
		1/16 in	33 lb Fiber Spool	S292419-029
Element™ 81K2M	E81T1-GM H8	.045 in	33 lb Fiber Spool	S294412-029
		.052 in	33 lb Fiber Spool	S294415-029
		1/16 in	33 lb Fiber Spool	S294419-029





Engineering Controls

The second most effective level of control recommended by OSHA requires controlling the hazard through a physical change to the workplace or a change in the design of equipment, such as increased ventilation. Miller's complete line of innovative extraction systems provides total weld fume solutions for any environment.

The Talk: Terms and definitions used in this section

Accu-Rated™: The true, accurate airflow at the inlet of the collection hood.

ZoneFlow™: Advanced technology that creates a negative pressure zone, allowing the weld particulate capture distance to be extended up to five feet deep and three feet wide.

MERV (Minimum Efficiency Reporting Value): A reliable standard to rate and compare filter media efficiency.

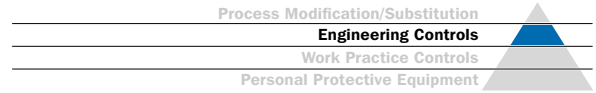
High Vacuum Extraction Systems: Draws air in at a high air transport velocity and high pressure, but a low air volume. Typically used to draw air through smaller, highly restrictive hoses or pipes, allowing the accessories to be mobile and reach restricted spaces more easily.

Low Vacuum Extraction Systems: Moves higher amounts of airflow (CFM) through larger ducts at a relatively low system pressure, providing a further source capture distance.



FILTAIR® Fume Extraction

The complete line of Miller® FILTAIR fume extractors are designed specifically for welding – drawing weld fumes away from the welder’s breathing zone and keeping your facility clean. We offer many types of Fume Extraction equipment to best fit your environment and fume control needs.



Mobile Extractors

FILTAIR Capture 5 – A Miller Exclusive!

Exclusive ZoneFlow™ technology creates the largest capture zone in the industry – up to five feet away, compared to the traditional 16 inch capture distance.

Ideal for:

- Heavy Equipment Manufacturing
- Fabrication
- Maintenance and Repair Operations

Accu-Rated™ Airflow: 900 CFM

Sound Level: Approximately 77 dBA at 5 ft

Increase Compliance and Productivity

- ▶ Up to three times larger capture zone than traditional extractors improves welder usage, increasing compliance
- ▶ Larger capture zone decreases arm movement for larger weldments, improving productivity

How it Works:

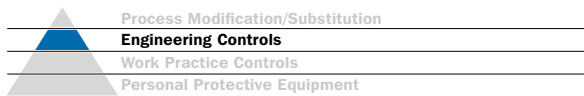
The weld fume capture distance is extended by a negative pressure zone that is designed to take air into the extraction arm at a standard rate of 900 cubic feet per minute (CFM) and release filtered air at approximately a 90 degree angle. The negative pressure zone created by this airflow moves the weld fume toward the center of the arm, resulting in maximum weld fume capture.

Part #	Description:
#951 639	230 V with 10 ft Pre-Assembled Extraction Arm
#951 640	230 V with 12 ft Pre-Assembled Extraction Arm
#951 574	460 V with 10 ft Pre-Assembled Extraction Arm
#951 575	460 V with 12 ft Pre-Assembled Extraction Arm
#951 594	575 V with 10 ft Pre-Assembled Extraction Arm
#951 595	575 V with 12 ft Pre-Assembled Extraction Arm



FUME EXTRACTION & RESPIRATORY PROTECTION

Mobile Extractor Systems



Mobile Extractors

FILTAIR® MWX

Mobile weld fume extractors designed to easily move with the welder and work.

Ideal for:

Manufacturing & Fabrication
 Maintenance & Repair Operations
 School & Training Facilities

Accu-Rated™ Airflow: 875 CFM

Sound Level: Approximately 70 dBA at 5 ft



Key Product Features:

- ▶ **Large Hood**
 The largest hood in the industry provides 360 degree rotation to obtain the best position over the weld – limiting the amount of weld fume entering the breathing zone. Position up to 18 inches from the arc.
- ▶ **Easy-to-Operate Extraction Arm**
 External adjustments allow air to pass through with less airflow resistance giving you stronger CFM (airflow). Reliable and accurate positioning across the full range of motion of the arm increases proper use and compliance. Easy maintenance ensures long-lasting operation and increased ROI. Extraction arms are pre-assembled in 7-, 10- and 12-foot lengths.
- ▶ **Filter Pressure Gauge**
 Front panel Filter Pressure Gauge is easy to read with color-coded graphics, indicating when pressure drop increases and the filter needs to be replaced (MWX-D) or cleaned (MWX-S).



Equipment and Options

MWX-D Packages

(Includes mobile extractor, high-efficiency filter and arm)

Part

Description:

MWX-D Packages (Includes mobile extractor, high-efficiency filter and arm)	#951 507	With 7 ft Extraction Arm and Disposable Filter
	#951 508	With 10 ft Extraction Arm and Disposable Filter
	#951 509	With 12 ft Extraction Arm and Disposable Filter
MWX-S Packages (Includes mobile extractor, high-efficiency filter and arm)	#951 510	With 7 ft Extraction Arm and Self-Cleaning Mechanism
	#951 516	With 10 ft Extraction Arm and Self-Cleaning Mechanism
	#951 517	With 12 ft Extraction Arm and Self-Cleaning Mechanism



Stationary Extractors

FILTAIR® 130

Extremely lightweight and portable high vacuum weld fume extractor ideal for moving with the welder and work. Only 46 pounds!

Ideal for:

Contractors
Maintenance & Repair Operations
Light Fabrication

Accu-Rated™ Airflow: 132 CFM

Sound Level: Approximately 68.5 dBA at 5 ft

Key Product Features:

- ▶ Lightweight – 46 lbs
- ▶ 70% Quieter for a safer work environment

Part #	Description:
#300 595	Includes Filter, 8 ft Hose and 20 ft Power Cord



FILTAIR® 400

High vacuum system that can be moved to different welding cells, with longer, more flexible hoses that maximize the portability of attachments. Extracts fume at the source with the use of funnel attachments, nozzles and fume guns.

Ideal for:

Manufacturing & Fabrication

Accu-Rated™ Airflow: 400 CFM

Sound Level: Approximately 74 dBA at 5 ft

Key Product Features:

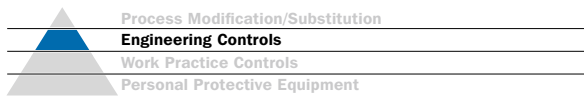
- ▶ Attach up to 6 fume guns
- ▶ 60 ft reach

Part #	Description:
#300 894	Includes Industrial High-Vacuum System. (Collection hoses ordered separately)



FUME EXTRACTION & RESPIRATORY PROTECTION

Stationary Extractor Systems



Stationary Extractors

FILTAIR® SWX

Wall or column mounted weld fume extractors designed for environments with weld areas that need filtration but do not have extensive floor space.

Ideal for:

Schools & Training Facilities
 Manufacturing & Fabrication
 Fixed Welding Cells/Stations

Accu-Rated™ Airflow: 875 CFM

Sound Level: Approximately 75 dBA at 5 ft



Key Product Features:

- ▶ **Easy-to-operate, Pre-assembled Extraction Arms**
 Designed to cover larger spaces. Available in 7-, 10-, and 12-foot lengths. External brackets and adjustments allow air to pass through with less resistance giving you stronger CFM (airflow).
- ▶ **Telescoping Arms**
 Designed to fit small booth spaces used in training centers and educational booths. Telescopes from 3 to 4.5 feet with a wide range of motion to cover all positions.
- ▶ **Filter Pressure Gauge**
 Easy-to-read front panel Filter Pressure Gauge indicates when pressure drop increases and the filter needs to be replaced (SWX-D) or cleaned (SWX-S). Note: On self-cleaning model, the filter gauge and cleaning control are mounted on a remote control box for easy access.



Equipment and Options

FILTAIR® SWX-D (Disposable Filter Model) Single-Arm Packages

(Includes SWX-D cabinet, disposable filter, blower, on/off control box, mounting bracket, duct, and 8 in arm. 115 VAC wiring NOT included.)

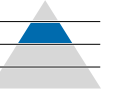
FILTAIR® SWX-S (Self-Cleaning Filter Model) Single-Arm Packages

(Includes SWX-S cabinet, self-cleaning control box and filter, blower, on/off control box, mounting bracket, duct, and 8 in arm. 115 VAC wiring NOT included.)

FILTAIR® SWX Dual-Arm Add-on Packages

(Includes blower, on/off control box, mounting bracket, duct, backdraft dampers, and 8 in arm. 115 VAC wiring NOT included.)

Part #	Description:
#951 619	With 3–4.5 ft Telescoping Extraction Arm
#951 513	With 7 ft Standard Extraction Arm
#951 514	With 10 ft Standard Extraction Arm
#951 515	With 12 ft Standard Extraction Arm
#951 620	With 3–4.5 ft Telescoping Extraction Arm
#951 516	With 7 ft Standard Extraction Arm
#951 517	With 10 ft Standard Extraction Arm
#951 518	With 12 ft Standard Extraction Arm
#951 621	With 3–4.5 ft Telescoping Extraction Arm
#951 519	With 7 ft Standard Extraction Arm
#951 520	With 10 ft Standard Extraction Arm
#951 521	With 12 ft Standard Extraction Arm



Centralized Extraction Systems

FILTAIR® 2000-12000

Custom engineered industrial centralized solutions designed for multiple capture sources that require ducting and accessories to complete the system.

Ideal for:

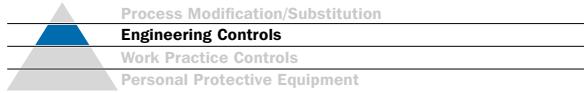
Manufacturing Facilities
Automated Welding Cells
Schools and Training Facilities

Key Product Features:

- ▶ 65% Smaller footprint than traditional systems
- ▶ 75% Quieter
- ▶ Ductwork can easily be reconfigured/reutilized
- ▶ Less expensive installation with completely packaged, fully assembled and pre-wired systems

FUME EXTRACTION & RESPIRATORY PROTECTION

Centralized Extraction Systems



FILTAIR® Centralized Extraction Systems Overview

Modular, Expandable Ductwork

- Clamp-together ducting easily integrates with existing ductwork and adapts to future facility needs – reducing the cost of ongoing plant changes

Spark Cooler®

Extend and protect the life of your filters and system

- Cool and suppress sparks before they reach the filter material
- Help prevent dust collector fires
- Minimal pressure drop, no maintenance, simple installation

Sprinkler Inlet

Increase safety and limit damage

- All FILTAIR Industrial Centralized Systems feature a sprinkler inlet ready for sprinkler head installation

Low-Profile Automation Hoods

- Exclusive technology - capture velocity zone is maximized and distributed over the work area
- Clear, UV-protected polycarbonate ceiling panels allow maximum light into cell
- Modular design for easy size and height change



Arms with External Supports

- Combined with our custom engineered systems, FILTAIR extraction arms with external supports maintain stronger suction capture velocity to ensure adequate ventilation to pull fume from the breathing zone



- Smaller footprint allows FILTAIR systems to fit where others cannot
- Maximize valuable floor space for more profitable work stations, increasing weld time

FilTek™ XL Filters

When it comes to selecting a fume extractor, nothing is more important than the filter.

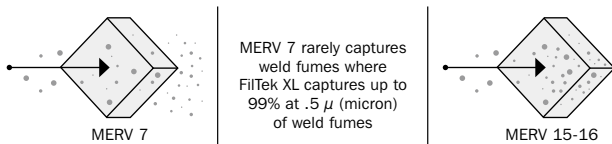
FilTek XL is an innovative, surface-loading filter that captures particles on the surface of the media (verses depth loading), making maintenance easier and extending the filter life.

Most weld fumes are less than one micron in diameter. The Miller FilTek XL filters have the highest MERV ratings in the industry – a class-leading MERV 15-16 – capturing up to 99% at .5 μ (micron) of weld fume particulate, including hexavalent chrome. The smaller the particles in the air, the higher the MERV rating required to capture them.



MERV Rating

M = Minimum **E** = Efficiency **R** = Reporting **V** = Value



Filter Media Performance Summary

FilTek XL filters have the highest efficiencies and lowest pressure drops to capture better, last longer and lower operating costs.

MERV 15 & 16 per ASHRAE 52.2	< 95% efficient
------------------------------	-----------------

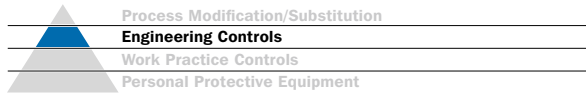
Filter Media Type	Weld Fume Capture Efficiency	Pressure Drop
Cellulose	Very Low	Low
Cellulose Blend	Low	Moderate
Spunbond Polyester	Moderate/High	High
Meltblown Composite	High	High
Miller FilTek XL	High	Low

Disposable vs. Self-cleaning Model Filters

XL Filters provide excellent surface loading qualities with very low resistance that makes them perfect for weld fume.

Disposable Model Filters: "D" model extractors have disposable filters with lower initial expenditures, but the need to replace the filter is more frequent.

Self-cleaning Model Filters: "S" model extractors have a self-cleaning mechanism that releases a strong reverse pulse of air to remove the collected fume off the outside of the filter. The self-cleaning models have higher initial expenditures, but require less maintenance and a much longer filter life.



FILTAIR® Accessories



Extraction Arms

Part #:	Description:
#301 242	Telescoping Arm, 6 in Diameter
#300 953	Standard Arm, 6 in Diameter, 7 ft Arm
#300 954	Standard Arm, 6 in Diameter, 10 ft Arm
#300 955	Standard Arm, 6 in Diameter, 12 ft Arm
#300 952	Arm Mounting Bracket and Ducting Kit, 6 in Diameter
#301 237	Telescoping Arm, 8 in Diameter
#300 980	Standard Arm, 8 in Diameter, 7 ft Arm
#300 981	Standard Arm, 8 in Diameter, 10 ft Arm
#300 982	Standard Arm, 8 in Diameter, 12 ft Arm
#300 771	Arm Mounting Bracket and Ducting Kit, 8 in Diameter



SWX Dual-Arm Add-On Packages

- #951 621 With Telescoping Arm
- #951 519 With 7 ft Standard Arm
- #951 520 With 10 ft Standard Arm
- #951 521 With 12 ft Standard Arm
- Includes 8 inch diameter arm, blower, control box, mounting bracket, duct and back draft dampers to turn single-arm weld fume extractor into dual-arm extractor



Spark Cooler®

- Available in a variety of sizes
- See representative for part numbers



FILTAIR Low Profile Modular Hoods

- Available in one foot increments from 4 x 4 feet up to 16 x 16 feet
- Corner lift hooks are convenient for installing or hanging over a work area. The hood can also be placed on an existing cell enclosure or supported with 9-, 10-, 12- or 14-foot post assemblies
- See representative for part numbers



FILTAIR® Accessories



130 and 400 Replacement Filters

#301 267 For 130 model (cleanable)
#300 925 For 400 model



MWX & SWX Replacement Filters

#300 540 Self-cleaning filter models
#300 539 Disposable filter models



Capture 5 Replacement Filter

#301 106



Centralized FilTek™ XL Replacement Filter

#300 927



Flexible Funnel Magnetic Nozzle

#300 668



Magnetic Nozzles

#300 669 11.8 in (300 mm) width
#300 670 23.6 in (600 mm) width (400 model only)



Dual Hose Inlet to Duct Adapter

#301 070 (400 model only)

- Y-shaped adapter connects duct to one or two hose attachments



Collection Hose

#300 672 17 ft (5.2 m)
#300 673 34 ft (10.4 m)



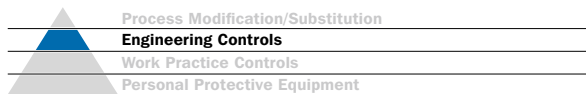
Hood Light with Arc Sensor

#300 689 MWX Series
#300 763 SWX Series

- Illuminates the welding zone and enables the fume extractor to start automatically when welding begins

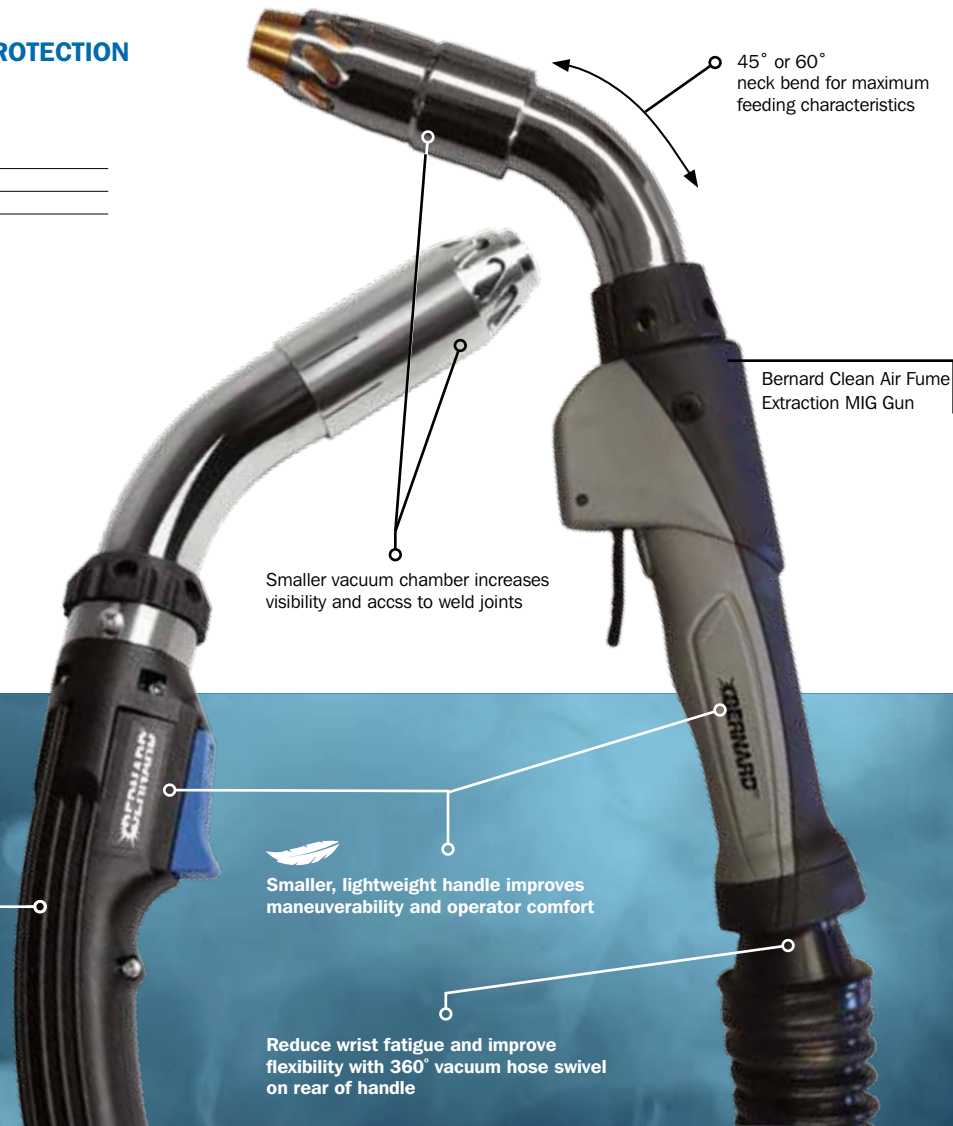
FUME EXTRACTION & RESPIRATORY PROTECTION

Bernard™ Fume Guns



Fume Guns

**Ideal Fume Extraction Solution
for Large Weldments and
Confined Spaces**



Bernard Clean Air Fume Extraction MIG Gun

Bernard FILTAIR Fume Extraction MIG Gun

NEW!

Bernard™ Clean Air™ Fume Extraction MIG Gun Bernard™ FILTAIR® Fume Extraction MIG Gun

Reduce smoke at the source to provide a cleaner, compliant work environment. Completely redesigned to closely match the weight, handle size, durability and industrial grade performance of regular Bernard MIG Guns, this welding gun was built with welder comfort and productivity in mind.

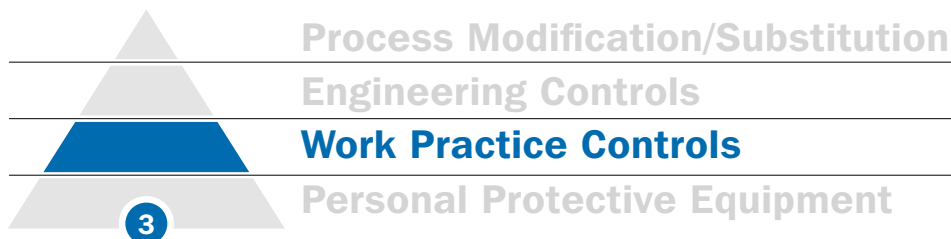
Get to the source and capture weld fume at the front of the gun via the chrome-plated vacuum chamber. Weld fume is suctioned through the gun handle, and into the hose to a port on the vacuum system to keep work environments clean and compliant.

Key Product Features:

- ▶ Available in 400, 500 and 600 amp models
- ▶ Lightweight, comfortable and durable design for industrial grade performance
- ▶ Nozzle shroud adjusts to one of four positions for optimized fume capture, gas flow and weld access
- ▶ Compatible with vacuum systems from most manufacturers
- ▶ Suitable for use with solid and flux core wires
- ▶ Durable crush and snag resistant vacuum hose eliminates the need for a bulky vacuum hose cover for most applications

Key Product Features:

- ▶ Available in 300 and 400 amp models
- ▶ Protect against porosity with vacuum regulator that balances suction with shielding gas flow
- ▶ Compatible with the FILTAIR 400 High Vacuum System and most major manufacturers
- ▶ Suitable for use with solid and flux core wires



Work Practice Controls

The third level of the OSHA Hierarchy is work practice controls, which does not remove the hazards, but includes general workplace and operation-specific rules that limit or prevent exposure to the hazards. Safe work practices involve adjustments to how a task is performed, along with regular maintenance and supervision of engineering controls. It is also important that everyone using any type of personal protective equipment knows how to use and maintain their PPE for optimal performance.

Examples of Work Practice Controls within a Welding Environment



Remove paint or coatings before welding to minimize the release of contaminants



Accurately adjust weld settings to ensure the most stable arc and reduce fume



Properly set up weld cells and fixtures to minimize operator exposure to fume plumes



Correct body positioning so that airflow pulls or pushes fume away from the breathing zone



Process Modification/Substitution

Engineering Controls

Work Practice Controls

Personal Protective Equipment

4

Personal Protective Equipment

When engineering controls are not feasible, while they are being implemented or when they do not reduce exposure levels enough, respiratory protection should be implemented. Miller respirators are specifically designed to offer protection from welding fumes – keeping welders safe, comfortable and productive.


The Talk: Terms and definitions used in this section

29 CFR 1910.134: OSHA standard that addresses respirator selection, use, implementation and creating a respiratory protection program.

Assigned Protection Factor (APF): Level of protection that a respirator is intended to provide, when used in conjunction with a written respiratory protection program.

Maximum Use Concentration (MUC): Calculation indicating the maximum atmospheric concentration of a hazardous substance that an employee can be expected to be protected when wearing a respirator.

$$\text{MUC} = \text{APF} \times \text{OSHA PEL}$$



WRPR: OSHA requires an employer to develop and implement a Written Respiratory Protection Program with required worksite-specific procedures and elements for both mandatory and voluntary respirator use. For employees voluntarily using respirators, employers must provide those users with a copy of Appendix D to OSHA 1910.134.

NEW!

N95 Disposable Mask Respirator

Features a flame retardant outer layer that offers necessary protection for welding applications.

NIOSH 42 CFR 84 Certified	APF = 10	OSHA Classification: Tight-Fitting ¹ Respirator
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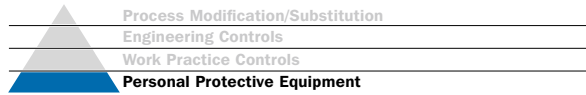
Part #:	Description:
#267 334	N95 Respirator with Valve, 10 Pack
#267 335	N95 Respirator with Valve and Nuisance Level OV Relief ² , 10 Pack



Key Product Features:

- ▶ N95 Filter Media provides 95% filtration of airborne particles, including those in the fume regulation chart
- ▶ Optional N95 nuisance level Organic Vapor respirators feature an added layer of carbon that helps remove nuisance level organic vapor odors*
- ▶ Ergonomic design allows user to feel more comfortable and less constricted without compromising the efficiency and effectiveness of the mask

¹ Fit testing is necessary for mandatory use. See page 24 for fit testing details.
² Nuisance level OV relief respirators are designed for use with organic vapor concentrations not exceeding OSHA's PELs or other applicable government occupational exposure limits, whichever is lower.



LPR-100™ Half Mask Respirator

Low-profile design fits comfortably under welding helmets and maximizes field of vision. The large, non-return exhaust valve eases breathing and reduces user fatigue.

NIOSH 42 CFR 84 Certified	APF = 10	OSHA Classification: Tight-Fitting ¹ Respirator
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Part #:	Description:
ML00894	LPR-100 Respirator with P100 Filters, Small/Medium
ML00895	LPR-100 Respirator with P100 Filters, Medium/Large
ML00994	LPR-100 Respirator with P100 Nuisance Level OV Relief Filters ² , Small/Medium
ML00995	LPR-100 Respirator with P100 Nuisance Level Ov Relief Filters ² , Medium/Large
SA00818	Replacement P100 Filters, Pair
SA00819	Replacement Combination P100/Nuisance Level OV Relief Filters, Pair
#261 086	Quantitative Face-Fit Test Kit

When use is mandatory, the Miller LPR-100 Half Mask Respirator needs to be fit tested prior to use and then annually or sooner if a change to the workplace or user occurs. Fit testing can be done either qualitatively or quantitatively to determine whether the mask provides an acceptable fit to the wearer.³

▶ **Quantitative:**
Uses measuring instruments to measure facial seal leakage

▶ **Qualitative:**
Relies on a subjective sensation (taste, irritation, smell) of the wearer to a particular test agent

³ OSHA-accepted fit test protocols and procedures are contained in 29 CFR 1910.134 Appendix A



Process Modification/Substitution
 Engineering Controls
 Work Practice Controls
 Personal Protective Equipment

Key Product Features:

- ▶ P100 Filters provide 99.97% filtration of airborne particles and oil aerosols, including those in the fume regulation chart
- ▶ Optional Combination P100/Nuisance level Organic Vapor respirators feature an added layer of carbon that helps remove nuisance level organic vapor odors*
- ▶ Four-point head strap adjustments with integrated comfort cushion provide a customized and comfortable fit
- ▶ Odor-free, non-allergenic, latex and silicone free, made from medical grade materials



Front View



Back View

Exclusive pleated filter design provides additional surface area for maximum efficiency and filter life

¹ Fit testing is necessary for mandatory use. See page 24 for fit testing details.
² Nuisance level OV relief respirators are designed for use with organic vapor concentrations not exceeding OSHA's PELs or other applicable government occupational exposure limits, whichever is lower.

FUME EXTRACTION & RESPIRATORY PROTECTION

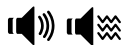
Powered Air Purifying Respirators



Powered Air Purifying Respirators (PAPRs)

Industrial protection for the most extreme welding applications, our PAPR systems are available with the Titanium 9400, 9400i and Hard Hat head assemblies.

NIOSH 42 CFR 84 Certified	APF = 25	OSHA Classification: Loose-fitting powered air purifying respiration	Hard Hat Certification: ANSI Z89.2 2009 Certified, Type 1, Class C or G	Helmet Lens Certification: Meets ANSI Z87.1+ and CSA Z94.3 Standards
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Audible & vibrating alarms notify user of low battery or restricted airflow



Dual air speeds allow user to adjust volume of air to maximize comfort



Lightweight blower design provides all-day comfort for reduced fatigue

Key Product Features:

- ▶ HEPA filter is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers, including those on the fume regulations chart
- ▶ Load-bearing shoulder straps evenly distribute weight
- ▶ Quick-release belt for easy, one-handed on/off
- ▶ Low-profile design allows for unrestricted movement and reduces interference
- ▶ Lightweight lithium ion battery provides up to 8 hours of life with no memory retention from frequent charging
 - 4-6 hr/high air speed
 - 6-8 hr/low air speed
 - 500 charges
- ▶ Two batteries included with each system



FUME EXTRACTION & RESPIRATORY PROTECTION

Powered Air Purifying Respirators

Process Modification/Substitution
 Engineering Controls
 Work Practice Controls
 Personal Protective Equipment

PAPR Systems:

Part #:	Description:
#264 879	Titanium 9400
#264 882	Titanium 9400 (No AD Lens)
#264 877	Titanium 9400i
#264 878	Titanium 9400i (No AD Lens)
#259 385	Hard Hat with Titanium 9400
#261 659	Hard Hat with Titanium 9400i
#259 386	Hard Hat

Replacement Parts:

Part #:	Description:
#235 673-2	Filter, Particulate (HEPA) (2 pack)
#235 673-6	Filter, Particulate (HEPA) (6 pack)
#235 673-36	Filter, Particulate (HEPA) (36 pack)
#235 674	Filter, Prefilter (Foam) (6 pack)
#244 841	Prefilter, Nuisance Level OV Relief (6 pack)
#235 676	Spark Guard
#245 818	Grinding Shield (Titanium 9400i)
#254 278	Grinding Shield Tear-aways (Titanium 9400i) (5 pack)

Accessories:

Part #:	Description:
#244 151	Belt Extension adds 18 inches in length



Helmet & Hard Hat Options
 For Added Versatility



Head and Face Protection

Ultraviolet (UV) and infrared (IR) radiation can be a significant threat to a welder's eyes and face, and even minimal exposure can cause burns. Helmets, protective glasses and goggles help prevent eye injury and skin burns. Different applications require different PPE, and it is critical to choose the right equipment for the job. Miller's complete line of head and face PPE provides welders with the best equipment – designed to protect and perform in demanding welding, cutting and grinding applications.

28	Introduction
32	Choosing the Right Lens
34	Helmet Selection Chart
36	Helmets <ul style="list-style-type: none">36 Titanium™ Series38 Digital Infinity™ Series40 Digital Elite™ Series42 Digital Performance™ Series44 Classic Series45 MP-10™ Series
46	Weld-Mask™ Auto-Darkening Goggles
48	Head Threads Helmet Accessories
50	Safety & Cutting Glasses



THE TALK: Terms and definitions used in this section

Ultraviolet Radiation (UV): A form of electromagnetic radiation with shorter wavelengths that emit bright light.¹

Infrared Radiation (IR): A form of electromagnetic radiation with longer wavelengths that produce heat.²

Welder's Flash or Arc Flash: A painful inflammation of the cornea caused by exposure to high-intensity ultraviolet light, resulting in pain, sensitivity and visual impairment.

Primary Protection: A device that may be worn alone or in conjunction with a secondary protector (i.e. safety glasses), per OSHA.

Secondary Protection: A device that may be worn only in conjunction with a primary protector (i.e. welding helmet, grind shield), per OSHA.

STATISTICS & TRENDS: Head & Face



90%

Eye injuries account for approximately 25% of all injury claims by welders.³ **90% of eye injuries can be prevented** through the use of proper protective eyewear.⁴



\$300 Million

Eye injuries alone cost more than \$300 million per year in lost production time, medical expenses and worker compensation.⁵

¹ <http://science.howstuffworks.com/dictionary/physics-terms/ultraviolet-radiation-info.htm>

² <http://science.howstuffworks.com/infraredradiation-info.htm>

³ <http://injuryprevention.bmj.com/content/11/3/174.long>

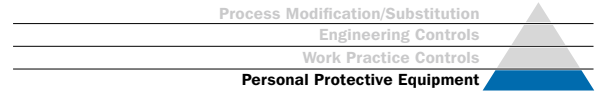
⁴ <https://ehs.okstate.edu/training/oshaeye.htm>

⁵ <https://www.osha.gov/SLTC/eyefaceprotection/>



OSHA Standard 1910.133

Primary eye protection (ex. safety glasses) should always be used with secondary eye/face protection (ex. welding helmet or grind shield).



Choosing The Right Helmet

The most important criteria when choosing a welding helmet are safety, compliance and comfort, but other valuable features to consider include: **lens type, viewing size, filter shade, number of sensors, ease of use, weight and useful technology.** Choosing the right helmet for your application(s) and overall comfort can increase your weld quality, productivity, safety and long-term health.

Lens Types and Shade Coverage

Lens	Passive Lens	Auto-Darkening Lens
Shade Type	Fixed Shade	Variable Shade
Inactive Shade Coverage	Shade Dependent	#14
Active Shade Coverage	Shade Dependent	#5-#13

▶ Passive Lens vs. Auto-Darkening Lens

Passive Lens: Utilizes a UV and IR coated dark-tinted glass, typically with a #10 fixed shade. A passive helmet is worn in the up position until the electrode, gun or torch is positioned. The welder then flips the helmet down with a quick nod of the head, just before the arc is struck.

Auto-Darkening Lens: Typically starts with a #3 or #4 shade in its inactive state. Depending on the light state, when an arc or cutting torch is started the lens darkens to shade #5-#13. The helmet stays in position, without the need for head nods – improving weld quality and reducing neck fatigue.

Auto-Darkening Helmet Options

▶ Fixed Shade Lens vs. Variable Shade Lens

Fixed Shade Lens: Senses an arc and darkens to a fixed shade. Ideal when using the same material, thickness and process every time you weld. Fixed shade lenses are available in different shades.

Variable Shade Lens: Adjusts the shade depending on the brightness of the arc. Ideal when using different materials and processes that vary the amperage.

▶ Number of Arc Sensors

More arc sensors on a helmet allow it to easily identify a change in lighting, increasing the sensitivity and accuracy of the auto-darkening function. Four sensors are best for fabrication or out-of-position welding, while two may be adequate for a hobbyist.

HEAD & FACE PROTECTION

Choosing the Right Lens



Eye Protection Against Radiant Energy

Choosing the Right Lens

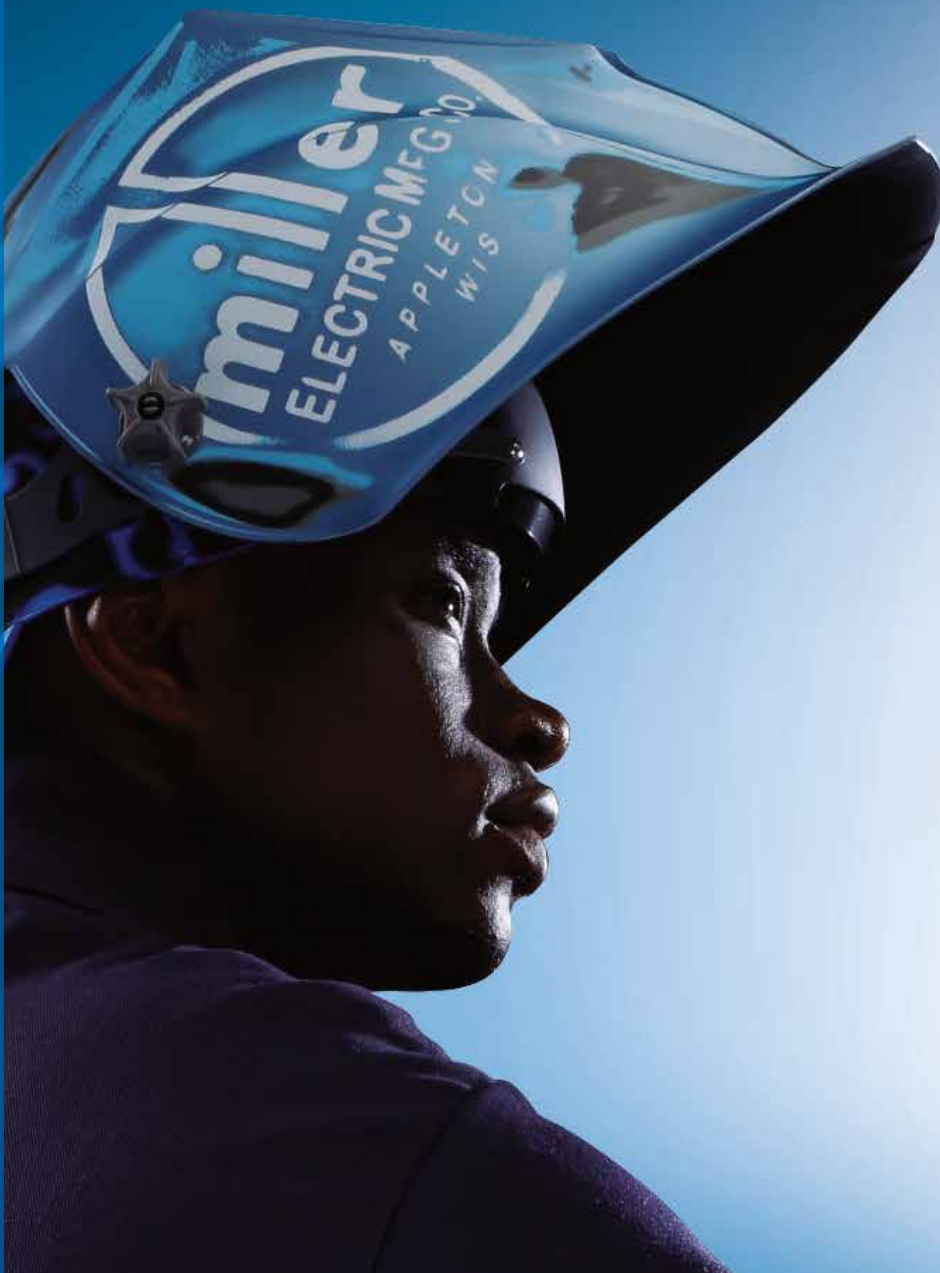
OSHA requires specific eye protection to ensure workers are safe. As a rule of thumb, start with a shade that is too dark to see the weld zone. Then, go to a lighter shade that gives a sufficient view of the weld zone without going below the minimum. During oxygen gas welding or cutting, where the torch produces a high yellow light, it is recommended to use a filter lens that absorbs the yellow or sodium line in the visible light (spectrum) of the operation.

What are ANSI Z87.1 Standards?

ANSI Z87.1 ensures that helmets and lenses have passed independent testing to show they can survive high velocity impact from flying objects, provide 100% ultraviolet and infrared filtering regardless of shade setting, and meet advertised switching speeds and darkness shades in temperatures as low as 23° F and high as 131° F.

An ANSI Z87.1+ marking indicates a high-impact rating for cutting and grinding.

All Miller welding helmets and glasses meet the ANSI Z87.1+ standards.



Filter Lenses for Protection During Shielded Metal Arc Welding¹

Operation	Electrode Size	Arc Current (Amperes)	OSHA Minimum Protective Shade Number	ANSI & AWS Shade Number Recommendations
Shielded Metal Arc Welding (SMAW)	Less than 3/32 in (2.4 mm)	Fewer than 60	7	-
	3/32-5/32 in (2.4-4.0 mm)	60-160	8	10
	More than 5/32-1/4 in (4.0-6.4 mm)	More than 160-250	10	12
	More than 1/4 in (6.4 mm)	More than 250-550	11	14

Filter Lenses for Protection During Other Welding and Cutting Operations

Operation	Arc Current (Amperes)	OSHA Minimum Protective Shade Number	ANSI & AWS Shade Number Recommendations
Gas Metal Arc Welding (GMAW) and Flux Cored Arc Welding (FCAW)	Fewer than 60	7	-
	60-160	10	11
	More than 160-250	10	12
	More than 250-500	10	14
Gas Tungsten Arc Welding (GTAW)	Fewer than 50	8	10
	50-150	8	12
	More than 150-500	10	14
Air Carbon Arc Cutting (CAC-A) (Light)	Fewer than 500	10	12
Air Carbon Arc Cutting (CAC-A) (Heavy)	500-1000	11	14
Plasma Arc Welding (PAW)	Fewer than 20	6	6-8
	20-100	8	10
	More than 100-400	10	12
	More than 400-800	11	14
Plasma Arc Cutting (PAC) (Light)*	Fewer than 300	8	9
Plasma Arc Cutting (PAC) (Medium)*			
	300-400	9	12
Plasma Arc Cutting (PAC) (Heavy)*	More than 400-800	10	14
Torch Brazing (TB)		3	3 or 4
Torch Soldering (TS)		2	2
Carbon Arc Welding (CAW)		14	14

Filter Lenses for Gas Welding and Oxygen Cutting Operations

Operation	Electrode Size	Arc Current (Amperes)	OSHA Minimum Protective Shade Number
Gas Welding	Under 1/8 in (3.2 mm)	4	5
	1/4 in to 1/2 in (3.2- 12.7 mm)	5	6
	Over 1/2 in (12.7 mm)	6	8
Oxygen Welding	Under 1 in (25 mm)	3	4
	1 in to 6 in (25-150 mm)	4	5
	Over 6 in (150 mm)	5	6

¹ <https://www.osha.gov/Publications/OSHAfactsheet-eyeprotection-during-welding.pdf>

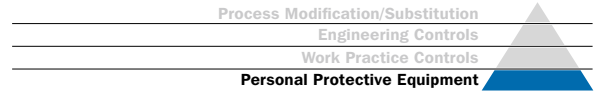
* Values apply where the actual arc is clearly seen. Lighter filters may be used when the arc is hidden by the workpiece.



Helmet Selection Chart

Choosing a helmet that is best suited for specific application(s) can increase productivity, weld quality, safety and comfort.

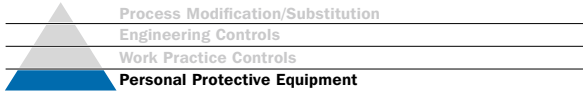
	Classic Series FS#10	Classic Series FS#10 Flip-Up	Classic Series Variable Shade
Viewing Area	5.15 sq in	5.07 sq in	5.15 sq in
Shades	Weld: 10	Weld: 10	Weld: 8-12
Modes	Weld	Weld	Weld
Integrated Grind Shield	No	Yes	No
Auto-on	Yes	Yes	Yes
Sensors	2	2	2
TIG Rating	20 amps	20 amps	20 amps
Switching Speed	1/3,600	1/3,600	1/10,000
Digital Controls	No	No	No
Premium Headgear	No	No	No
InfoTrack™	No	No	No
Weight	16 oz (454 g)	14 oz (396 g)	16 oz (454 g)



Classic Series VSi™	Digital Performance™	Digital Elite™	Digital Infinity™	Titanium 1600™	Titanium 1600i™	Digital Titanium 7300™	Digital Titanium 9400™	Digital Titanium 9400i™
5.15 sq in	7.22 sq in	9.22 sq in	Largest in Industry! 13.4 sq in	16 sq in	16 sq in	7.22 sq in	9.22 sq in	9.22 sq in
8-13	Cut: 5-8 Weld: 8-13	Cut: 5-8 Weld: 8-13	Cut: 5-8 Weld: 8-13	Passive	Passive	Cut: 5-8 Weld: 8-13	Cut: 5-8 Weld: 8-13	Cut: 5-8 Weld: 8-13
Weld/X-Mode	Weld/Cut/Grind	Weld/Cut/Grind/ X-Mode	Weld/Cut/Grind/ X-Mode	N/A	N/A	Weld/Cut/ X-Mode/ External Grind	Weld/Cut/ X-Mode/ External Grind	Weld/Cut/ X-Mode
Yes	No	No	No	No	Yes	No	No	Yes
Yes	Yes	Yes	Yes	N/A	N/A	Yes	Yes	Yes
3	3	4	4	N/A	N/A	3	4	4
5 amps/below	5 amps	5 amps/below	5 amps/below	N/A	N/A	5 amps/below	5 amps/below	5 amps/below
1/20,000	1/20,000	1/20,000	1/20,000	N/A	N/A	1/20,000	1/20,000	1/20,000
No	Yes	Yes	Yes	No	No	Yes	Yes	Yes
No	Yes	Yes	Yes	No	No	Yes	Yes	Yes
No	No	No	No	No	No	Yes	Yes	Yes
23 oz (652 g)	17 oz (482 g)	18 oz (510 g)	22 oz (624 g)	17 oz (482 g)	22.5 oz (638 g)	19 oz (539 g)	20 oz (567 g)	24 oz (680 g)

HEAD & FACE PROTECTION

Titanium™ Series Welding Helmets



Titanium™ Series

Designed to perform in the most demanding industrial environments.

Meets ANSI Z87.1+ and CSA Z94.3 Standards

3-Year Warranty*



9400i™

Part #:	#256 177
Viewing Area:	9.22 sq in
Arc Sensors:	4
Operating Modes:	4 – Weld, Cut, Grind & X-Mode
Weight:	24 oz
Integrated Grinding Shield:	Yes



9400™

Part #:	#256 176
Viewing Area:	9.22 sq in
Arc Sensors:	4
Operating Modes:	4 – Weld, Cut, Grind & X-Mode
Weight:	20 oz
Integrated Grinding Shield:	No



7300™

Part #:	#256 175
Viewing Area:	7.22 sq in
Arc Sensors:	3
Operating Modes:	4 – Weld, Cut, Grind & X-Mode
Weight:	19 oz
Integrated Grinding Shield:	No



1600i™

Part #:	#255 519
Viewing Area:	16 sq in
Arc Sensors:	-
Operating Modes:	-
Passive Shade:	#10
Weight:	22.5 oz
Integrated Grinding Shield:	Yes

*90 Day Limited Warranty



External Grind Mode – Switch to grind mode with the push of a button (available on the 7300 and 9400).



Aluminum Heat Shield – Keeps lens protected in high heat/amp applications.



Silver Shell – Reflects heat to keep helmet and user cool.



InfoTrack™ – Exclusive arc tracking technology allows the lens to track arc time for productivity tracking, and includes a digital clock display with the ability to set an alarm or timer.



1600™

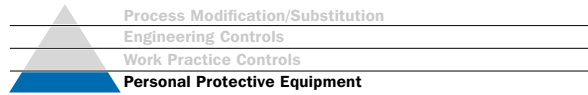
Part #:	#245 799
Viewing Area:	16 sq in
Arc Sensors:	-
Operating Modes:	-
Passive Shade:	#10
Weight:	17 oz
Integrated Grinding Shield:	No

*90 Day Limited Warranty



HEAD & FACE PROTECTION

Digital Infinity™ Series Welding Helmets



NEW!

Digital Infinity™ Series

The largest view helmet for demanding applications.

Meets ANSI Z87.1+ and CSA Z94.3 Standards

3-Year Warranty



Black

Stars and Stripes™

Camouflage

Departed™

Viewing Area:	Arc Sensors:	Operating Modes:	Weight:
13.4 sq in	4	4 – Weld, Cut, Grind & X-Mode	22 oz

Part #:	Description:
#271 329	Black
#271 330	Stars and Stripes™
#271 331	Camouflage
#271 332	Departed™
#271 325	Replacement Headgear with Comfort Cushion

HEAD & FACE PROTECTION

Digital Infinity™ Series Welding Helmets

Process Modification/Substitution
Engineering Controls
Work Practice Controls
Personal Protective Equipment



Oversized comfort cushion provides unsurpassed comfort and stability.

13.4 square inches

The largest view helmet for demanding applications



InfoTrack™ – Exclusive arc tracking technology allows the lens to track arc time for productivity tracking, and includes a digital clock display with the ability to set an alarm or timer.



Enhanced Headgear



Digital Controls



X-Mode

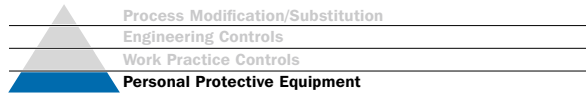


Auto On/Off



HEAD & FACE PROTECTION

Digital Elite™ Series Welding Helmets



Digital Elite™ Series

The ultimate welding helmet PLUS four modes of digital versatility for intense applications.

Meets ANSI Z87.1+ and CSA Z94.3 Standards	3-Year Warranty
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Viewing Area:	Arc Sensors:	Operating Modes:	Weight:
9.22 sq in	4	4 – Weld, Cut, Grind & X-Mode	18 oz
Part #:	Description:	Part #:	Description:
#257 213	Black	#257 214	Lucky's Speed Shop™
#269 946	Hot Rod Garage™	#257 217	Inferno™
#269 273	Blue Flame	#256 158	Fury™
#264 852	Stars and Stripes™ III	#256 173	Camouflage
#259 485	Vintage Roadster™	#268 618	Cat® - 1st Edition
#260 127	Not Forgotten™	#256 174	Replacement Headgear



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HEAD & FACE PROTECTION

Digital Elite™ Series Welding Helmets

Process Modification/Substitution

Engineering Controls

Work Practice Controls

Personal Protective Equipment



X-Mode – Eliminates interference from sunlight and out-of-position welding angles, like those found in pipe welding or in obstructed or hidden cavity welds.

Digital Controls – Adjust mode and settings with the push of a button.



Enhanced Headgear



Digital Controls



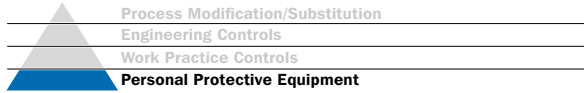
X-Mode



Auto On/Off

HEAD & FACE PROTECTION

Digital Performance™ Series Welding Helmets



Digital Performance™ Series

Mid-range welding helmet designed for all welding applications.

Meets ANSI Z87.1+ and CSA Z94.3 Standards	3-Year Warranty
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Black America's Eagle™ II Camouflage Blue Rage™



'64 Custom™ Illusion™ Cat® - 1st Edition

Viewing Area:	Arc Sensors:	Operating Modes:	Weight:
7.22 sq in	3	3 – Weld, Cut & Grind	17 oz
Part #:	Description:	Part #:	Description:
#256 159	Black	#256 160	'64 Custom™
#264 851	America's Eagle™ II	#256 165	Illusion™
#256 163	Camouflage	#268 739	Cat® - 1st Edition
#256 164	Blue Rage™	#256 174	Replacement Headgear



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HEAD & FACE PROTECTION

Digital Performance™ Series Welding Helmets

Process Modification/Substitution

Engineering Controls

Work Practice Controls

Personal Protective Equipment



Enhanced Headgear



Digital Controls



Auto On/Off

HEAD & FACE PROTECTION

Classic Series Welding Helmets

Process Modification/Substitution
Engineering Controls
Work Practice Controls
Personal Protective Equipment

Classic Series

Designed for farm, home and hobby.

Meets ANSI Z87.1+ and CSA Z94.3 Standards	2-Year Warranty
---	-----------------



Auto On/Off



X-Mode*
*VSi only



Black –
Fixed Shade

Black –
Variable Shade

Black –
FS#10 2x4 Flip-Up

Black –
VSi



Stars and Stripes™

Metalworks™

Red Flame

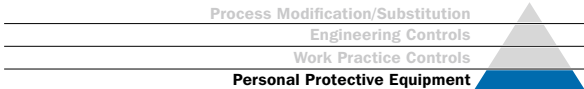
Camouflage

Viewing Area:	Arc Sensors:	Operating Modes:	Weight:
5.15 sq in	2	1 – Weld	16 oz
Part #:	Description:	Part #:	Description:
#231 703	Black – Fixed Shade	#271 345	Stars and Stripes™
#251 292	Black – Variable Shade	#271 346	Metalworks™
#263 038	Black – FS#10 2x4 Flip-Up	#271 347	Red Flame
#260 938	Black – VSi	#271 348	Camouflage
#256 174	Replacement Headgear		



HEAD & FACE PROTECTION

MP-10™ Series Welding Helmets



MP-10™ Series

Passive helmet with a shade #10 filter.

Meets ANSI Z87.1+ and CSA Z94.3 Standards	90 Day Limited Warranty
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Large Viewing Area



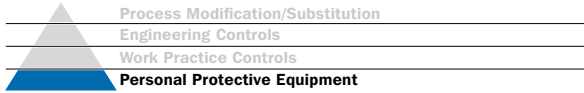
Black

Inferno

Viewing Area:	Arc Sensors:	Operating Modes:	Weight:
16 sq in	4	4 – Weld, Cut, Grind & X-Mode	18 oz
Part #:	Description:		
#238 497	Black (Each)		
#235 626	Black (6 Pack)		
#238 496	Inferno™		
#770 246	Replacement Ratchet Headgear		

HEAD & FACE PROTECTION

Weld-Mask™ Auto-Darkening Goggles



NEW!

Weld-Mask™ Auto-Darkening Goggles

Ideal for welding in tight spaces, mobile welding and welding inspection.

Meets CE/ANSI/CSA/AS NZ standards.	2-Year Warranty
------------------------------------	-----------------

Part #:	Description:
#267 370	Weld-Mask™ Auto-Darkening Goggles

Key Product Features:

- ▶ Compact design allows users to weld in spaces where access with traditional welding helmets is limited
- ▶ Use for: gas welding & cutting, MIG, TIG and stick
- ▶ Ideal for use with hard hats
- ▶ Eye covering fits tightly to the face to block out light for precision welding in bright surroundings
- ▶ Face shield and head cover provide coverage for UV/IR rays and applications with limited spatter
- ▶ Goggles feature shades 5, 7, 9, 11, and 13 (light state shade 3)

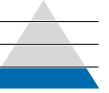


Process Modification/Substitution

Engineering Controls

Work Practice Controls

Personal Protective Equipment



External controls for quick and convenient access



Lightweight design virtually eliminates neck strain

Accessories

Weld-Mask Cover Lens (Package of 5)
#267 420

Weld-Mask FR Head Cover
#267 421

- For use with Weld-Mask auto-darkening goggles, or under a traditional welding helmet for added protection

CR2032 Replacement Battery
#270 055



Head Threads

Key Product Features:

- ▶ Bandanas feature sewn-in sweatband
- ▶ Caps are reversible with low, soft bill



Head Thread Size Chart

Caps	Size 7	Size 7-1/8	Size 7-1/4	Size 7-3/8	Size 7-1/2	Size 7-3/4
American Pride	#230 553	#230 554	#230 555	#230 556	#230 557	#230 558
Blue Flame	#230 535	#230 536	#230 537	#230 538	#230 539	#230 540
Dragon	#230 547	#230 548	#230 549	#230 550	#230 551	#230 552
Ghost Skulls	#230 541	#230 542	#230 543	#230 544	#230 545	#230 546
Bandanas (One Size Only)	Black #250 904	Dragon #230 560	Maple Leaf #250 905	Skull & Barbed Wire #230 559		

Head & Face Accessories



NEW!

Slotted Hard Hat Adapter

#259 637

Compatible with most slotted hard hats.
(Helmet and hard hat not included)



Hard Hat Adapter

#213 110 (XL and XLi Series)

#222 003 (Titanium, XLix, Elite, Performance, ProHobby,
Classic and MP-10 Series)

Compatible with Fibre Metal and MSA hard hats. Other brands may
or may not fit. (Helmet and hard hat not included)



Helmet Hook

#251 018

- Holds your helmet or grinding shield
- Silicone strap secures helmet in place



Headgear - Gen 1
#256 174



Headgear - Gen 2
#256 174



NEW!
Headgear - Gen 3
#271 325



NEW!
Headgear Suspension Pad
#271 326



Fabric Headband
#770 249



2x4 Auto-Darkening Lenses
#770 660 (Shade 8) • #770 659 (Shade 9)
#770 226 (Shade 10) • #770 961 (Shade 11)
• Auto-On/Auto-Off
• Light state shade #3
Fits all 2x4 inch windows. 2-year warranty



Helmet Bib
#253 882
• WeldX™ helmet bib provides added protection
• Velcro® attachment



Job-Site Tool Bag
#228 028
• Unzipped bag opening: 12 x 18-1/2 in
• Comfortable, padded shoulder strap
• Over 20 separate pockets



Helmet Bag with Miller® Logo
#770 250
• Drawstring closure
• Ultra-soft inside liner
• Exterior storage pouch



9400i & VSi Replacement Grind Shield
#245 818



Grind Shield Lens Tear-Off
#254 278 (5 Pack)



Lithium Battery
#217 043

Cover Lenses

Part #:	Description:	Quantity:
#231 411	Front: Classic, Classic VS, Classic VSi	5 pkg.
#231 410	Inside: Classic, Classic VS, Classic VSi, 2x4 Flip-up	5 pkg.
#231 921	Front: Performance	5 pkg.
#770 327	Inside: Performance, Titanium 7300	5 pkg.
#216 326	Front: Elite, Titanium 1600, Titanium 1600i, Titanium 7300, Titanium9400, Titanium 9400i,	5 pkg.
#216 327	Inside: Elite, Titanium 9400, Titanium 9400i	5 pkg.
#271 319	Front: Infinity	5 pkg.
#271 320	Inside: Infinity	5 pkg.
#235 628	Inside: Titanium 1600i	5 pkg.

Bulk Cover Lenses

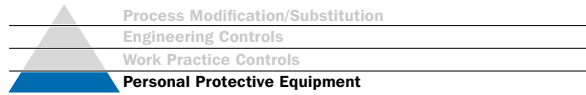
Part #:	Description:	Quantity:
#216 326B	Front: Elite, Titanium, MP-10	50 pkg.
#216 327B	Inside: Elite, Titanium, 9400i	50 pkg.
#231 921B	Front: Performance	50 pkg.
#770 237B	Inside: Performance	50 pkg.
#231 411B	Front: Pro-Hobby, Classic	50 pkg.

Magnifying Lenses

Part #:	Magnification:	Part #:	Magnification:
#212 242	2.5	#212 237	1.25
#212 241	2.25	#212 236	1.00
#212 240	2.00	#212 235	.75
#212 239	1.75		
#212 238	1.5		

HEAD & FACE PROTECTION

Safety and Cutting Glasses



NEW! Coming Soon

Safety and Cutting Glasses

Meets ANSI Z287.1+ Standards

Key Product Features:

- ▶ Anti-Fog
- ▶ Form-fitting orbital eye coverage enhances protection
- ▶ Shatterproof polycarbonate lenses
- ▶ Rubber ear pads on select models for additional comfort
- ▶ Wrap around designs meet ANSI side shield requirements

Frame Style/Color	Lens	Part #
Classic	Clear	#272 187
Classic with Strap	Clear	#272 188
Spark™	Clear	#272 190
Spatter™ - Black	Clear	#272 191
	Smoke	#272 195
Spatter™ - White	Clear	#272 198
	Smoke	#272 199
Slag™ - Black	Clear	#272 201
	I/O	#272 202
	Smoke	#272 203
	#3	#272 204
	#5	#272 205
Slag™ - White	Clear	#272 206
	I/O	#272 207
	Smoke	#272 208
	#3	#272 196
	#5	#272 209



Classic

- Angle adjustable temples for personalized fit
- Lightweight for all-day comfort
- Frameless design provides unobstructed view



Classic with Strap

- Elastic strap holds glasses tight to face for improved protection
- Foam padding blocks debris
- Lightweight for all-day comfort



Spark™

- Wrap-around design enhances vision
- Flexible over-molded temples conform to user's head
- Rubber nose piece provides comfort and prevents slipping



Spatter™

- Rubber temples and nose piece provide extreme comfort and security
- Enhanced comfort and styling promote compliance
- Half-frame increases view



Slag™

- Rubber temples and nose piece provide extreme comfort and security
- Enhanced comfort and styling promote compliance
- Full-frame design optimizes protection

Lens Options

Select from a wide range of lens options for any application

- All lenses feature anti-fog coating and high quality optics
- I/O (Indoor/Outdoor) lenses feature light shading with a mirrored finish to reduce glare in indoor and outdoor applications
- Smoke lenses provide shade protection in outdoor applications
- Shade #3 and #5 green IR lenses offer protection for cutting, brazing, or soldering applications



Clear



I/O



Smoke



#3



#5



Hand and Body Protection

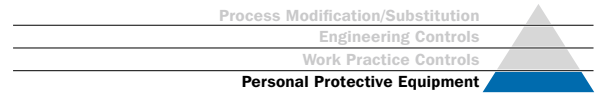
Jackets, gloves and apparel can be found in every welding facility, but not all products are created equal. Making sure your operators are wearing the best protection for the application is critical in not only reducing injuries and downtime, but also ensuring optimal performance. If the protection is comfortable, has a good fit and provides the necessary protection your welders will keep it on – increasing productivity and compliance.

52 Introduction

56 Gloves

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64 INDURA® FR Cotton
65 Combo
66 WeldX™
68 Leather





The Talk: Terms and definitions used in this section

NFPA – National Fire Protection Association, the world's leading advocate of fire prevention. The NFPA develops, publishes and distributes codes and standards intended to minimize the possibility and effects of fire and other risks.

ANSI – American National Standard Institute, a nonprofit organization that defines and oversees common standards and assessment systems.

Kevlar® Thread – Almost 2½ times stronger than nylon or polyester, with a heat decomposition (turns to ash) of 800° F. Does not melt.

Flame Retardant – Materials that have been chemically treated to self-extinguish. Surface finishes and coatings are applied that inhibit, suppress or delay the production of flames.

Flame Resistance – Materials that are inherently self-extinguishing and resistant to catching fire. They will not melt or drip when exposed directly to extreme heat, and protection is built into the fiber itself and can never be worn away or washed out.

The Statistics: Hand & Body



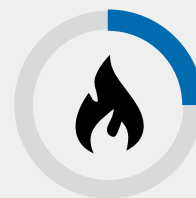
70%

70% of employees with hand injuries reported not wearing gloves at the time of the injury. The injuries of the remaining 30% were caused by inadequate, damaged or inappropriate gloves.¹



25%

More than 25% of all workplace accidents involve hand and finger injuries.²

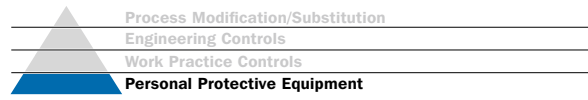


25%

Work-related burns account for 20-25% of all serious burns requiring hospital attention.

¹ Bureau of Labor Statistics Work Injury Reports - eye, face, head & hand injuries

² http://www.ansellpro.com/main/pressRoom_whitePapers_details.asp?rid=35



Are You Covered?

Protecting worker's hands and bodies is not only essential to safeguarding their most critical instruments on the job, but is also a regulated requirement. OSHA requires personal protective clothing for workers who weld, cut or braze.

Selecting the right hand and body protection can affect more than safety – apparel and gloves made specifically for the demands of welding contribute to increased comfort, productivity and performance.



OSHA Standard 1910.132

- Employees exposed to the hazards created by welding, cutting, or brazing operations must be protected by PPE in accordance with the requirements of the general personal protective equipment standard. Appropriate protective clothing required for any welding will vary with the size, nature and location of the work to be performed.



ANSI Z49.1¹

- Requires all welders to wear protective flame-resistant gloves that provide the heat resistance and general hand protection needed for welding.
- Must be in good repair, dry and capable of providing protection from electric shock by the welding equipment.
- Insulating linings should be used to protect areas exposed to high radiant energy.
- Clothing and apparel must provide sufficient coverage and be made of suitable materials to minimize skin burns, ideally leather or flame-resistant materials.



NFPA 51B, 5.1 Personal Protective Clothing

- Clothing shall be selected to minimize the potential for ignition, burning, trapping hot sparks and electric shock.

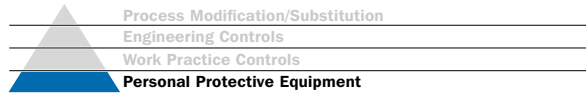


 Miller.

 Miller.

HAND & BODY PROTECTION

Welding Gloves



Welding Gloves

Hand injuries are a common workplace injury, and extremely preventable. The number one reason workers remove hand protection is due to discomfort¹. Miller gloves are designed using a three-dimensional pattern providing an excellent fit, resulting in unprecedented comfort and dexterity – keeping gloves on your operators and alleviating injuries.

Glove 101

- ▶ Select gloves made of materials that will perform best according to the specific application.
- ▶ Make sure the glove fits for added safety, comfort and dexterity. A glove that is too big or small can decrease performance and increase the risk of injury.
- ▶ Engage workers in the selection process – they’ll be more likely to wear them if they choose them.
- ▶ Conduct regular inspections to make sure the gloves are in good condition before wearing. Replace any gloves that are worn or torn.

How to Get the Proper Fit

Measure Around Your Dominant Hand



Size:	Inch:
XS	6 - 7
S	7 - 8
M	8 - 9
L	9 - 10
XL	10 - 11
XXL	11 - 12

Glove Features

Component	Thread	Lining			
Material	Kevlar®	Wool	Cotton/Foam	Cotton	Aluminized
Feature	<ul style="list-style-type: none"> • High heat resistance, does not melt • 2 ½ times stronger than nylon or polyester thread • Has little to no stretch for a tight seam 	<ul style="list-style-type: none"> • Best heat protection • Thicker, with somewhat limited dexterity • Designed for higher heat and cold weather applications • Wicks Moisture 	<ul style="list-style-type: none"> • Good for medium - to heavy-stick welding applications • Cotton absorbs moisture • Foam protects against heat 	<ul style="list-style-type: none"> • Maximum dexterity • Maximum moisture absorption 	<ul style="list-style-type: none"> • Reflects radiant heat for high heat handling

Component	Exterior					
Material	Cowhide	Deerskin	Pigskin	Goatskin	Sheepskin	Silicone
Feature	<ul style="list-style-type: none"> • Most versatile • Various grades and grains available, which affects pliability and strength • Ideal for Stick and MIG welding and handling 	<ul style="list-style-type: none"> • Extremely soft • Snug fit provides maximum dexterity • Ideal for TIG welding and lighter-duty handling 	<ul style="list-style-type: none"> • Soft and durable • Naturally resistant to moisture • Extremely breathable • Ideal for Stick and MIG welding and handling 	<ul style="list-style-type: none"> • Greatest tensile strength for weight • Resistant to scraping and rubbing • Ideal for TIG and MIG welding and handling 	<ul style="list-style-type: none"> • High dexterity rating • Smooth surface for wire handling • Ideal for TIG welding 	<ul style="list-style-type: none"> • Strong and durable • Resists temperature extremes, oxidation and ultraviolet radiation • Withstands up to 660° F • Repels moisture

Process Modification/Substitution

Engineering Controls

Work Practice Controls

Personal Protective Equipment

Sewn with 100% flame-resistant Kevlar® thread for maximum seam strength

Dual-padded, pig grain palm for added comfort



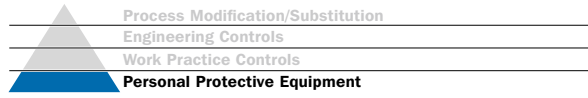
Strategically placed silicone patches on back for heat and spatter protection

Extra Heavy Duty MIG/Stick glove shown

Each glove is made from multiple pieces of material, creating a three-dimensional pattern that comfortably wraps and supports the hand for increased comfort and dexterity

HAND & BODY PROTECTION

Welding Gloves



Performance Gloves

Unprecedented comfort and performance with exceptional dexterity and flexibility.



Extra Heavy Duty MIG/Stick

- An industry first! Strategically placed silicone patches on back for heat and spatter protection
- Multi-layered insulated palm and back
- Dual-padded, pig grain palm for added comfort



Heavy Duty MIG Stick (Long Cuff)

- Padded forearm for additional protection and comfort
- Triple layered insulated back
- Strategically placed patches of pig grain and cow split back for extended glove life



Heavy Duty MIG Stick

- Strategically placed patches on palm and back for extended glove life
- Double layered insulated palm and back
- Premium pig grain leather provides extreme durability and protection



MIG/Stick

- Strategically placed patches on palm and back for extended glove life
- Double layered insulated palm and back
- Cow split leather provides extreme durability and protection



Process Modification/Substitution

Engineering Controls

Work Practice Controls

Personal Protective Equipment



MIG (Lined)

- Dual padded palm for added comfort
- Fleece insulated palm, foam insulated back
- Cow grain palm, pig split back and goat grain inner fingers provide exceptional dexterity and comfort



MIG (Unlined)

- Unlined palm for heightened feel and dexterity
- Double layer insulated back and dual padded palm for added comfort
- Cow grain palm, cow split back and goat grain inner fingers provide exceptional dexterity and comfort



TIG

- Completely unlined for heightened feel and dexterity
- Triple padded palm for added comfort
- Premium goat grain leather offers superior flexibility and dexterity



TIG/Multitask

- Wool back provides ultimate insulation
- Dual padded palm for added comfort
- Premium goat grain leather offers superior flexibility and dexterity



Work

- Dual-padded palm for added comfort
- Fleece back provides ultimate insulation
- Cow grain leather offers superior durability and abrasion resistance



Metalworker

- Durable top grain leather and spandex back for enhanced durability and dexterity
- Neoprene wrist with Velcro® closure increases fit and support
- Padded, reinforced palm and thumb saddle for extended wear
- Not intended for welding

Performance Gloves

	XS	S	M	L	XL	2XL
Extra Heavy Duty MIG/Stick	-	-	-	#263 350	#263 351	-
Heavy Duty MIG Stick (Long Cuff)	-	-	-	-	#263 342	-
Heavy Duty MIG Stick	-	-	-	#263 339	#263 340	#269 615
MIG/Stick	-	-	-	#263 343	#263 344	#269 616
MIG (Lined)	#263 330	#263 331	#263 332	#263 333	#263 334	#269 618
MIG (Unlined)	-	-	#263 335	#263 336	#263 337	#269 619
TIG	#263 345	#263 346	#263 347	#263 348	#263 349	-
TIG/Multitask	-	#263 352	#263 353	#263 354	#263 355	-
Work	-	-	#266 041	#266 042	#266 043	-
Metalworker	-	-	#251 066	#251 067	#251 068	-



Welding Apparel

Protective welding apparel that performs in your specific environment is crucial to keeping welders safe and on the job. Not all apparel is created equal – construction and quality materials combine for an ideal fit that encourages welders to keep their PPE on, increasing compliance and performance.

4 Steps to Creating an FR Program

- 1 Identify Your Hazards**
What exposures do your welders face?
- 2 Perform a Hazard Assessment**
Identify industry standards and regulations.
- 3 Select Your Fabric**
Based on specific applications, what is the best fabric for your welders?
- 4 Educate/Train Your Team**
Make your team aware of the importance, maintenance and proper usage of protective apparel.

Select Your Fabric

Fabric	Description	Cost	Durability	Protection Level
Classic FR Cotton	Ideal for everyday use. Nine ounce, flame-resistant, pre-shrunk fabric features quality material without compromising your bottom line.	\$	•	Light-Duty
INDURA® FR Cotton	The Indura brand name is derived from “Industrial Durability.” Indura is a 100% cotton, flame-resistant fabric, guaranteed for the life of the garment. Indura will self-extinguish and will not ignite, but it can burn.	\$\$	••	Light-Duty
Combo	Perfect mix of top-grain leather and Indura FR cotton, providing additional protection in high-exposure areas.	\$\$\$	•••	Medium-Duty
WeldX™	Extreme flame-resistant properties won't burn, melt, ignite or shrink - repelling sparks, spatter and other molten metals. Chromium free for easy disposal. Machine washable, retains FR properties. A Miller exclusive.	\$\$\$\$	••••	Medium-Duty
Leather	Top-grain pigskin leather withstands sparks and spatter for long-term industrial use.	\$\$\$\$	•••••	Heavy-Duty





All Classic FR cotton apparel features finished hems and reinforced stitching for enhanced durability.

Classic FR Cotton

Classic FR Cotton

Protect your operators without compromising your bottom line.

Key Product Features:

- ▶ Ideal for everyday use
- ▶ Nine ounce, flame-resistant, navy cotton
- ▶ Pre-shrunk fabric
- ▶ All Classic FR cotton apparel features finished hems and reinforced stitching for enhanced durability



Classic FR Cotton Jacket

- Barracuda style stand-up collar for extra neck protection
- Accessible inside pocket
- Five button snaps provide added protection
- "Fold-in" sleeve snaps for a better fit around the wrist
- 30 inch torso length

Classic FR Cotton Jacket Sizing & Part Numbers

	S	M	L	XL	2XL	3XL	4XL	5XL
Part #	#244 749	#244 750	#244 751	#244 752	#244 754	#244 755	#244 756	#244 758
Chest Width	42 in	46 in	50 in	54 in	58 in	62 in	66 in	70 in
Sleeve Length	31 in	32 in	33 in	34 in	35 in	36 in	37 in	38 in
Shoulder Width	15.5 in	17 in	18.5 in	20 in	21.5 in	23 in	24.5 in	26 in

Process Modification/Substitution

Engineering Controls

Work Practice Controls

Personal Protective Equipment



Classic FR Cotton Cape Sleeves

- Allows for the attachment of our Bib accessory along the chest
- Barracuda style stand-up collar for extra neck protection
- "Fold-in" sleeve snaps for a better fit around the wrist



Classic FR Cotton Bib

- #247 147
- 19 inch length
- Adjustable belt closure provides a quick easy-on/easy-off option



Classic FR Cotton Sleeves

- #247 148
- 18 inch length
- Innovative one-handed cinch closure for easy adjustability
- "Fold-in" sleeve snaps for a better fit around the wrist



Classic FR Cotton Lab Coat

- Barracuda style stand-up collar for extra neck protection
- 40 inch length
- "Fold-in" sleeve snaps for a better fit around the wrist



Classic FR Cotton Apron

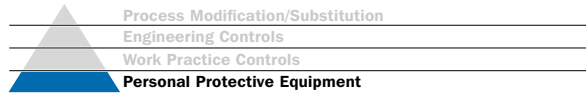
- #247 149
- 35 inch length
- Convenient adjustable drawstring ensures a superior fit around the neck and waist
- Accessible front pocket

Classic FR Cape Sleeves & Lab Coat Part Numbers

	S	M	L	XL	2XL	3XL	4XL	5XL
Lab Coat	-	-	#252 000	#252 001	#252 002	-	-	-
Cape Sleeves	#247 138	#247 139	#247 140	#247 142	#247 143	#247 144	#247 145	#247 146

HAND & BODY PROTECTION

INDURA® FR Cotton



INDURA® FR Cotton

Key Product Features:

- ▶ Derived from "Industrial Durability" 100% cotton, flame-resistant fabric
- ▶ Flame-resistance guaranteed for the life of the garment
- ▶ Pre-shrunk fabric

INDURA® FR Cotton

Men's Jacket

- Barracuda style stand-up collar for extra neck protection
- Easy-access slash front pockets
- "Fold-in" sleeve snaps for a better fit around the wrist
- Reinforced snaps to prevent ripping of the jacket
- 30 inch torso length



Men's Jacket

INDURA® FR Cotton

Women's Jacket

- Tailored, fitted design provides less restriction and better movement
- Barracuda style stand-up collar for added neck protection
- Functional and stylish - finished hems and contrast stitching



Women's Jacket

INDURA® FR Cotton Men's Jacket Sizing & Part Numbers

	S	M	L	XL	2XL	3XL	4XL	5XL
Part Number	#258 095	#258 097	#258 098	#258 099	#258 100	#258 101	#258 102	#258 104
Chest Width	44 in	48 in	52 in	56 in	60 in	64 in	68 in	72 in
Sleeve Length	32 in	33 in	34 in	35 in	36 in	37 in	38 in	39 in
Shoulder Width	18 in	19 in	20 in	21 in	22 in	24 in	25 in	27 in

INDURA® FR Cotton Women's Jacket Sizing & Part Numbers

	S	M	L	XL	2XL
Part Number	#264 379	#264 380	#264 381	#264 382	#264 383
Shoulder Width	14 in	16 in	18 in	19 in	20 in
Chest Width	19 in	21 in	23 in	25 in	26 in
Sleeve Length	32 in	33 in	34 in	36 in	38 in
Torso Length	22 in	25 in	26 in	27 in	27 in

Combo

Key Product Features:

- ▶ Perfect mix of top-grain leather and INDURA® FR cotton, providing additional protection in high-exposure areas
- ▶ Flame-resistant INDURA® 100% cotton is guaranteed for the life of the garment
- ▶ Pre-shrunk fabric

Combo Jacket

- Top-grain leather placed on sleeves and shoulders to increase overall protection
- Allows for the attachment of Miller's patented Bib/Apron accessory along the chest as a bib or at the bottom as an apron
- Barracuda style stand-up collar for extra neck protection
- Easy-access slash front pockets
- "Fold-in" sleeve snaps for a better fit around the wrist
- Reinforced snaps with leather to prevent ripping of the jacket
- 30 inch torso length

Combo Sleeves

#231 096

- Top-grain leather is lightweight and can be positioned for more protection where needed
- Wide elastic band at top of sleeve securing fit
- Flame-resistant cuff for extra comfort and protection
- 21 inch length

Leather® Bib/Apron

#231 125

- Provides added protection where you need it for extended jacket life
- Patented hidden snap design



Combo Jacket Sizing

	S	M	L	XL	2XL	3XL	4XL	5XL
Part Number	#231 080	#231 081	#231 082	#231 083	#231 084	#231 085	#231 086	#231 087
Chest Width	44 in	46 in	50 in	52 in	58 in	62 in	65 in	69 in
Sleeve Length	32 in	33 in	34.5 in	35 in	37 in	37.5 in	39.5 in	40 in
Shoulder Width	17.5 in	18 in	19 in	20 in	22 in	23 in	24 in	25 in



WeldX™

A Miller® exclusive

Key Product Features:

- ▶ 7 oz WeldX fabric – A lighter weight alternative to leather
- ▶ Extreme flame-resistant properties won't burn, melt, ignite or shrink – repelling sparks, spatter and other molten metals
- ▶ Chromium free for easy disposal
- ▶ Machine washable, retains FR properties
- ▶ All WeldX products have finished hems and reinforced stitching for enhanced durability



WeldX™ Jacket

- 7 oz WeldX front and sleeves combined with 9 oz Flame-resistant Navy cotton back provides optimal protection
- Lined sleeves for added protection
- Zipper closure with Velcro® storm flap
- Extended rear tail
- Vented back for improved air flow
- Barracuda style stand-up collar for extra neck protection
- Accessible inside pocket
- "Fold-in" sleeve snaps for a better fit around the wrist
- 32 inch torso length

WeldX™ Jacket Sizing & Part Numbers

	S	M	L	XL	2XL	3XL	4XL	5XL
Part Number	#247 114	#247 115	#247 116	#247 117	#247 118	#247 119	#247 120	#247 121
Chest Width	42 in	46 in	50 in	54 in	58 in	62 in	66 in	70 in
Sleeve Length	32 in	33 in	34 in	35 in	36 in	37 in	38 in	39 in
Shoulder Width	19 in	20 in	21 in	22 in	23 in	24 in	25 in	26 in

Process Modification/Substitution

Engineering Controls

Work Practice Controls

Personal Protective Equipment



WeldX™ Cape Sleeves

- 7 oz WeldX front and sleeves combined with 9 oz Flame-resistant Navy cotton back provide optimal protection
- Allows for the attachment of our Bib accessory along the chest
- Barracuda style stand-up collar for extra neck protection
- Pre-shrunk fabric eliminates shrinkage
- "Fold-in" sleeve snaps for a better fit around the wrist



WeldX™ Bib

- #247 133
- 19 inch length
- Adjustable belt closure provides a quick easy-on/easy-off option



WeldX™ Sleeves

- #247 137
- 18 inch length
- Innovative one-handed cinch closure for easy adjustability
- "Fold-in" sleeve snaps for a better fit around the wrist



WeldX™ Apron

- #247 134
- 35 inch length
- Convenient adjustable drawstring ensures a superior fit around the neck and waist
- Accessible front pocket

WeldX™ Cape Sleeves Part Numbers

	S	M	L	XL	2XL	3XL	4XL	5XL
Cape Sleeves	#247 122	#247 123	#247 124	#247 126	#247 127	#247 128	#247 130	#247 131



Withstands sparks and spatter for extreme, long-term industrial use

Leather

Leather

Key Product Features:

- ▶ Top-grain pigskin leather withstands sparks and spatter for extreme, long-term industrial use
- ▶ Sewn entirely with Kevlar® thread for added durability at each seam

Leather Jacket

- Barracuda style stand-up collar for extra neck protection
- Expandable leather strategically placed for enhanced mobility
- Satin lining for added comfort
- Reinforced snaps to prevent ripping of the jacket
- 30 inch torso length



Leather Jacket Sizing & Part Numbers

	S	M	L	XL	2XL	3XL	4XL	5XL
Part Number	#231 088	#231 089	#231 090	#231 091	#231 092	#231 093	#231 094	#231 095
Chest Width	44 in	48 in	52 in	56 in	60 in	64 in	68 in	72 in
Sleeve Length	32 in	33 in	34 in	35 in	36 in	37 in	38 in	39 in
Shoulder Width	18 in	19 in	20 in	21 in	22 in	24 in	25 in	27 in



General Fabric Care

Classic FR, INDURA®

The best results in cleaning and utilization of detergent supplies are obtained when using softened water. Classic and INDURA® fabrics can be washed at temperatures up to 165°F (75°C). Softeners, starches, bleach, hydrogen peroxide bleach and soap are not recommended.

Combo, WeldX™, Leather

Dry clean only.

The thermal protective properties of any flame resistant fabric can be compromised by the presence of contaminants on the fabric. Even though the original fabric is fully flame resistant as measured by standard test protocols, flammable contaminants on garments can ignite and burn until consumed, thereby increasing heat transfer to the wearer and leading to flame resistance failure. Garments must be laundered thoroughly to remove contaminants. It is recommended to wash garments prior to wearing. Load size 65% – 80% of capacity.

It is recommended that garments be washed and dried inside out. This will minimize surface abrasion and aid in maintaining the surface appearance of garments constructed of UltraSoft®, UltraSoft AC® and INDURA® fabrics.

The flame resistant polymer contained in UltraSoft®, UltraSoft AC® and INDURA® fabrics is highly resistant to most acids, bases and solvents. Exposure to strong acids, such as hydrochloric or sulfuric, however, may degrade the strength of the cotton fiber and even cause holes in the fabric. Additionally, these fabrics should not be exposed to strong oxidizers, such as bleach (over 6% sodium hypochlorite) and hydrogen peroxide, and strong reducers, such as sodium hydrosulfite. Strong oxidizing and reducing agents can cause an adverse reaction with the flame resistant polymer.



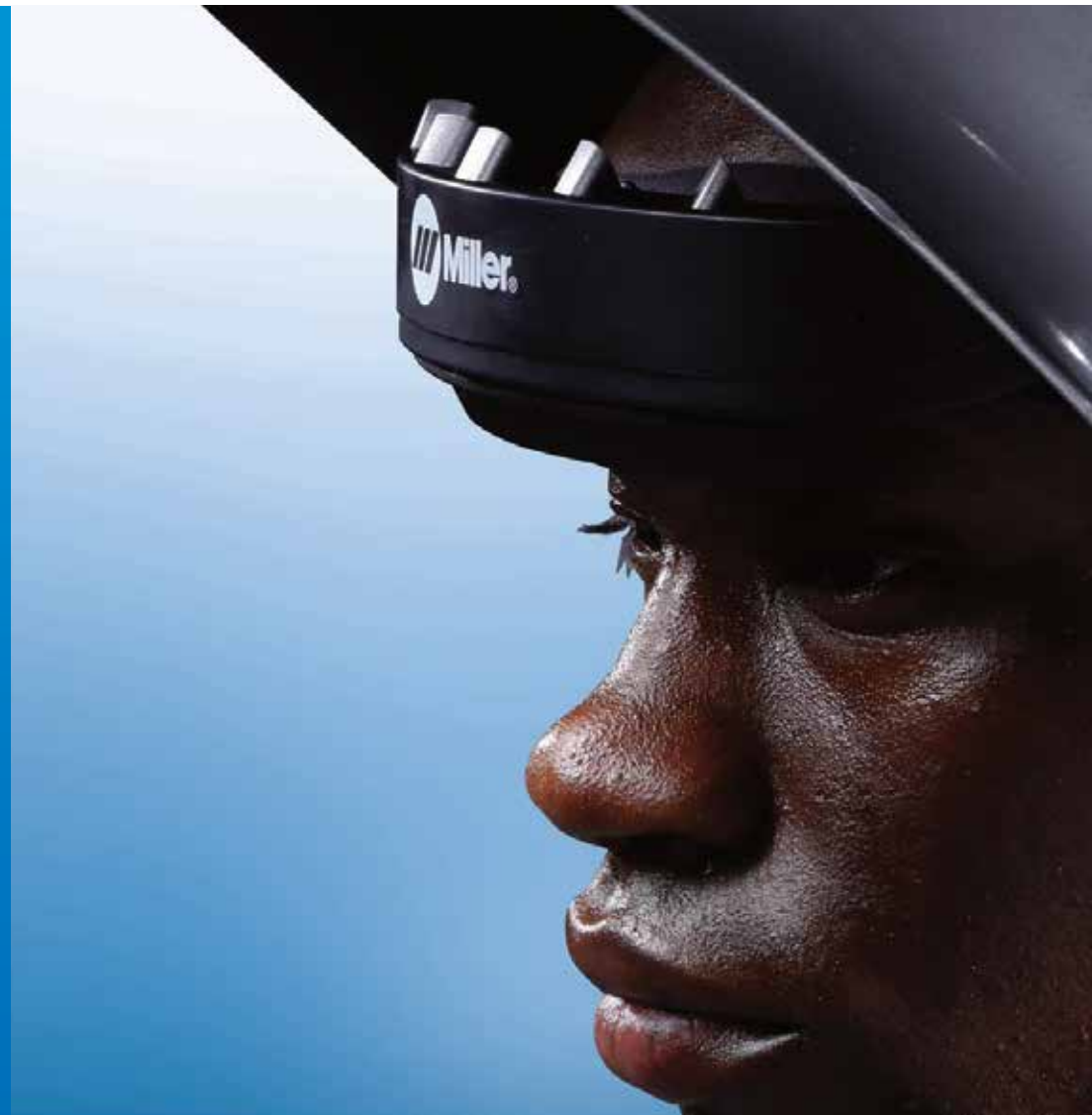
Heat Stress Protection

Heat stress is not only a serious condition for workers, but it can greatly reduce productivity and increase operator errors. The heat of the welding arc and added warmth of protective clothing can make already hot conditions even more intense for welders. Miller cooling products help lower body temperatures and can be an effective solution to help improve the welder's well being and performance on the job.

72 Introduction

74 CoolBand™ II

75 CoolBelt™



The Talk: Terms and definitions used in this section

Acclimatization: The time needed for physiological adaptation to extreme temperature changes. An average individual takes about 1 to 2 weeks to adapt to extreme hot temperatures.

Body Heat Balance: Steady state equilibrium between body heat production and heat loss to the environment.

Wet Bulb Globe Temperature (WBGT): Composite temperature used to estimate the effect of temperature, humidity, wind speed, and radiation (usually sunlight) on humans. Used by industrial hygienists to determine appropriate exposure levels to high temperatures. It can also be adjusted and measured for indoor indexes.

Wet Bulb (WB): The temperature at which water evaporates into the air. It is significant when compared to skin temperature because of the affect it has on how much of a worker's sweat evaporates.

Threshold Limit Values (TLV): Guidelines designed for use by industrial hygienists in making decisions regarding safe levels of exposure to various chemical substances and physical agents found in the workplace.

Statistics & Trends: Heat Stress



688

Heat related deaths per year. 65% reported exposure to excessive heat as the underlying cause of death.¹



2%

The amount workers output decreases for each degree above 77°.



40%

Of all heat-related illness cases cause victims to **miss two or more days of work.**

¹ <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5529a2.htm>

HEAT STRESS PROTECTION

Introduction



Understand and Prevent Heat Stress

Welders can be exposed to very hot environments all year, especially when temperatures rise during summer months. Understanding the different types of heat stress, symptoms and first aid treatments will help keep your team safe.

Know the symptoms

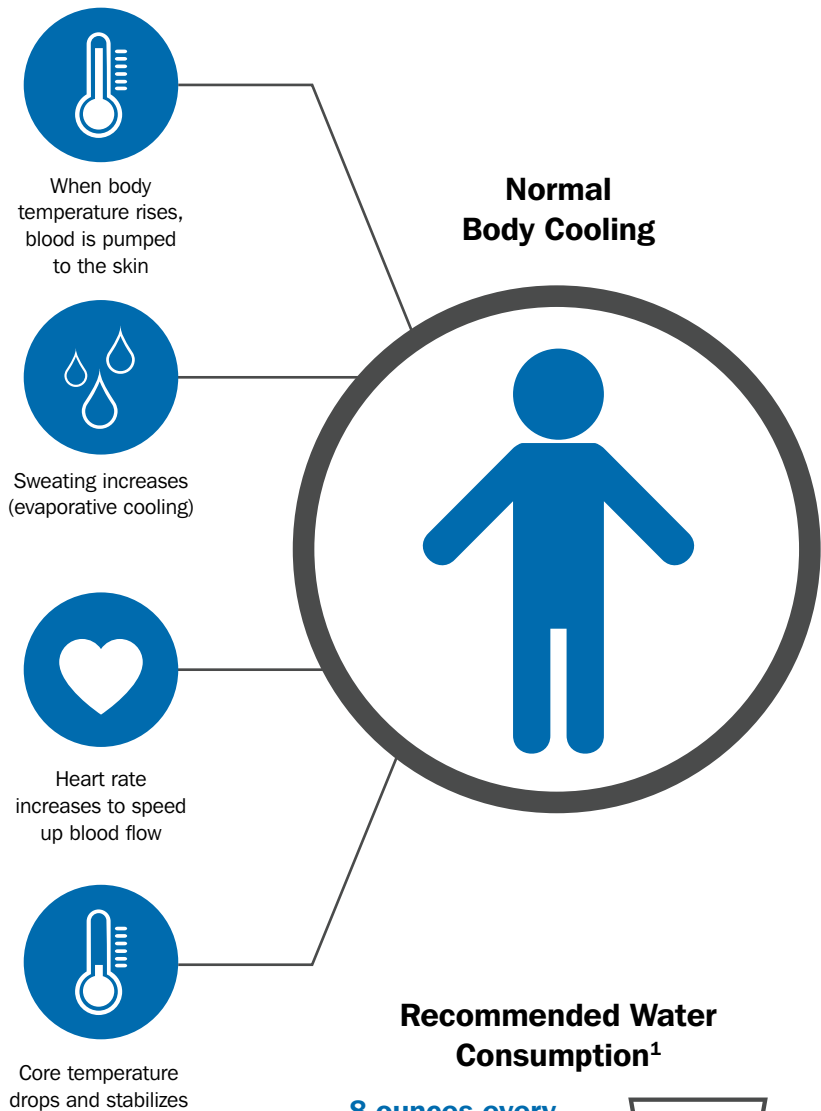
- Hot, dry skin or profuse sweating
- Hallucinations
- Chills
- Throbbing headache
- High body temperature
- Confusion/dizziness
- Slurred speech

First Aid

- Call 911
- Move worker to a cooler area
- Loosen or remove clothing
- Spray the worker with room temperature water
- Apply cold packs to the groin, neck and armpits
- Do not fully immerse in water



If someone is experiencing heat stroke, do not have them drink water, as they could aspirate and have further complications



Recommended Water Consumption¹

8 ounces every 15 to 20 minutes

During moderate activity in moderately hot conditions



Process Modification/Substitution

Engineering Controls

Work Practice Controls

Personal Protective Equipment

Types of Heat Stress¹

Heat Stroke: Critical condition – Call 911! Occurs when the body can no longer control its own temperature due to failure of the sweating mechanism, causing body temperature to rapidly rise. Heat Stroke can cause permanent disability or death.

Heat Cramps: Sweating depletes the body's salt and moisture levels, causing painful cramps.

Heat Collapse (Syncope): Dehydration and lack of acclimatization can contribute to fainting or dizziness. This condition can be very serious if workers are operating machinery.

Heat Rash: Skin irritation (typically a cluster of small red blisters) caused by excessive sweating during hot, humid conditions that gives a prickling sensation.

Heat Fatigue: Typically occurs due to lack of acclimatization, leaving the worker tired and with impaired performance.

There are many different ways to measure and determine if an environment is too hot for workers. Two of the more common means are the Heat Index and Permissible Heat Exposure TLV, providing information on when caution needs to be taken and recommended work/rest regimens.

Permissible Heat Exposure Threshold Limit Value (TLV)

Heat Index	Risk Level	Protective Measures
Less than 91°	Lower (Caution)	Basic heat safety and planning
91°F to 103°F	Moderate	Implement precautions and heighten awareness
103°F to 115°F	High	Additional precautions to protect workers
Greater than 115°F	Very High to Extreme	Triggers even more aggressive protective measures

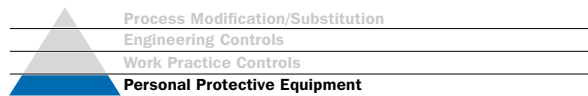
These TLV levels are based on the assumption that nearly all acclimatized, fully clothed workers with adequate water and salt intake should be able to function effectively under the given working conditions without exceeding a deep body temperature of 100.4°F. They apply to physically fit and acclimatized individuals wearing light summer clothing.

¹ <http://www.cdc.gov/niosh/topics/heatstress>

² https://www.osha.gov/SLTC/heatillness/heat_index/index.html

HEAT STRESS PROTECTION

CoolBand™ II



Helmet Cooling

Excessive heat exposure can lead to very serious health risks and be a detriment to performance. When engineering controls or work practice controls are not sufficient to reduce heat exposures, innovative cooling products can reduce worksite injuries by lowering the temperature under the hood through evaporative cooling – keeping welders cool, safe and productive.

CoolBand™ II

Constant airflow over the welder's head and face can decrease temperatures up to 8 degrees under the hood. The CoolBand II fits seamlessly with most Miller helmets*, providing a slim, balanced fit for all-day comfort.

Part #:	Description:
#261 970	CoolBand™ II

* Not compatible with XL Series, Classic VSi, Titanium 1600i or 9400i helmets

Key Product Features:

- ▶ Upward air vents cool entire head
- ▶ Downward air vents cool face and temples
- ▶ Reduces lens fogging
- ▶ Removable air deflector provides airflow direction adjustability
- ▶ Oversized power button for easy on/off
- ▶ Lightweight lithium polymer rechargeable battery – up to 6 hours of run time



Upward Air Vents
cool entire head

Downward Air Vents
cool face and temples



Up to 8° Cooler
under the hood

Evaporative Cooling

A physical occurrence in which evaporation of a liquid (perspiration) into surrounding air cools an object (welder). As the perspiration evaporates it absorbs heat. Increased airflow leads to an increased evaporation rate, cooling the welder more quickly.

CoolBelt™

Designed for industrial use, this lightweight, belt-mounted cooling system delivers maximum airflow, keeping the welder's head and face cool, removing stagnant air and decreasing lens fog. With temperatures up to 17 degrees cooler under the hood, the operator experiences improved comfort and lower incidence of heat fatigue and illness.

Part #:	Description:
#245 230	CoolBelt

* Not compatible with XL Series™ Helmets

Key Product Features:

- ▶ Dual air speeds provide airflow adjustability
- ▶ Constant airflow removes hot, stagnant air and reduces lens fog
- ▶ Swivel hose connection for maximum maneuverability
- ▶ Lightweight lithium ion rechargeable battery – up to 6 hours of run time

By cooling a worker 15 degrees, they will make approximately 90% fewer errors¹

Determine your potential savings by lowering welders' temperatures 15 degrees:

$$\begin{aligned}
 &(\text{Number of heat-related errors at 95 degrees}) \\
 &\times (\text{cost of fixing errors}) \\
 &\times .90 \\
 \hline
 &= \text{Total Potential Savings of Reducing Heat Related Errors}
 \end{aligned}$$



Up to 17° Cooler under the hood



LED Button
Shows battery status and current airflow speed

¹ British Journal of Industrial Medicine, 3, 143-158

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Miller® Welding Safety & Health For Health. For Safety. For Life.

Miller Safety & Health personal protective equipment and fume management solutions are designed specifically for the risks prevalent within welding environments - with products and services that fulfill OSHA's Hierarchy of Controls at all levels.

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Safety eNewsletter

Stay on top of the latest regulations and learn how other occupational health and safety specialists have improved the safety and health of their workplace with Miller's quarterly safety eNewsletter.

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