Miller®

The Power of Blue®

Welding Safety & Health Guide

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

VOLUME II

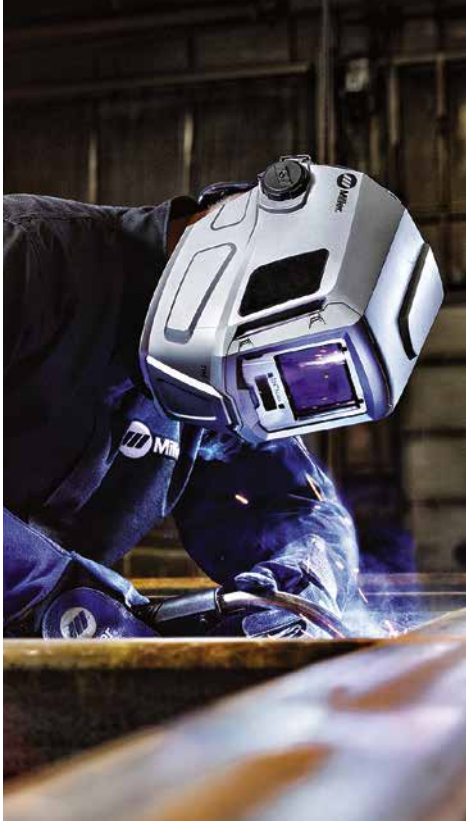
MillerWelds.com/Safety

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!

Fume Extraction & Respiratory Protection



Head & Face Protection

Hand & Body Protection

Heat Stress Protection

Fume Extraction & Respiratory Protection

Providing a safe, healthy and compliant work environment doesn't need to be complicated. Miller and ITW welding products are your single-source solution for weld 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.

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 that a worker may be exposed to established by OSHA.

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

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

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

Threshold Limit Value (TLV®): Guidelines for exposure to chemical substances that may be present in the workplace, below which there should not be an unreasonable risk of disease or injury. Established and utilized by the ACGIH.

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; regulates what manufacturers emit out of their shops.

Statistics & Trends: Fume Extraction & Respiratory Protection

#4-Respiratory Protection

OSHA's 2017 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 another applicable government occupational exposure limit, 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 argon and carbon dioxide, 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.

		Exposure Limits	
Substance	**Prevalent In**	**OSHA - PEL (Enforceable)[1]**	**ACGIH® - TLV® (Recommended)**
Aluminum	Aluminum Alloys, Steel Additive, Electrode Coatings	5.0 mg/m³ TWA	1.0 mg/m³ TWA
Beryllium	Copper, Magnesium & Alluminum Alloys	0.002 mg/m³ TWA, 0.025 mg/m³ Ceiling	0.00005 mg/m³ TWA
Cadmium	Coatings of Electrodes	0.005 mg/m³ TWA	0.1 mg/m³ TWA
Copper	Copper Metals, Electrodes	0.1 mg/m³ TWA	0.2 mg/m³ TWA
Hexavalent Chromium	Stainless, High Alloy Steels, Some Non-Alloy Sheets	0.005 mg/m³ TWA, 0.1 mg/m³ TWA	0.05 mg/m³ TWA
Iron (Iron Oxide)	Most Welding Fumes	5.0 mg/m³ TWA	5.0 mg/m³ TWA
Lead	Solder, Brass & Bronze Alloys, Steel Coatings	0.05 mg/m³ TWA	0.05 mg/m³ TWA
Manganese	Most Welding Fumes: Electrodes & Steels	0.2 mg/m³ Ceiling	0.02 mg/m³ TWA
Nickel	Stainless, Nickel Alloys	0.5 mg/m³ TWA	0.2 mg/m³ TWA
Zinc (Zinc Oxide)	Galvanized Metal Coatings	5.0 mg/m³ TWA	2.0 mg/m³ TWA

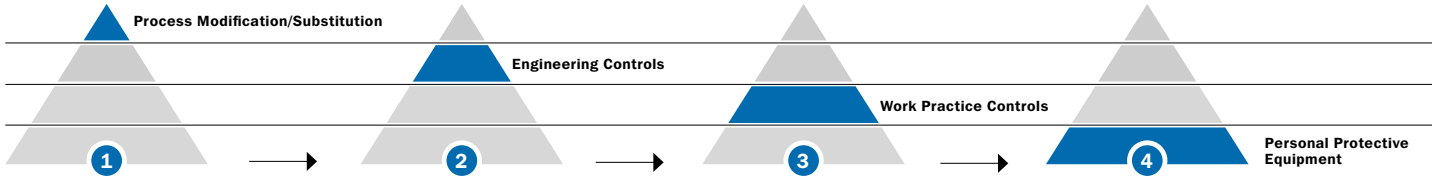
[1] More strict regulations may apply. Be sure to understand the relevant regulations in your area.

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-manganese welding consumables, changing to a welding process with lower fume generation or integrating automated 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, Miller LiveArc™ and AugmentedAc™

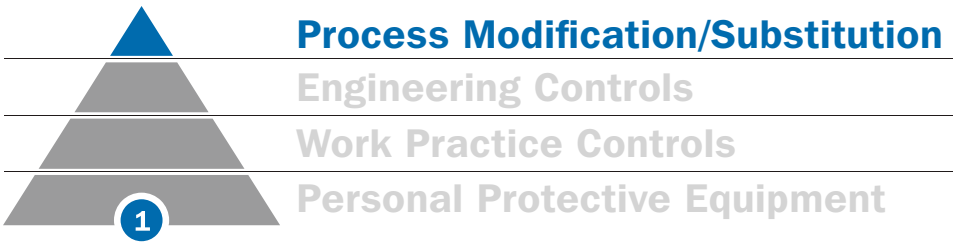
Work practice controls include changes to workplace procedures, policies and the way people work that limit and/or prevent exposure to the hazards. Training, job scheduling and hygiene are examples of work practice controls that can be used to minimize worker exposure to welding fume. Often these controls 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

The first, and most effective level in the hierarchy of controls, removes the hazard 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

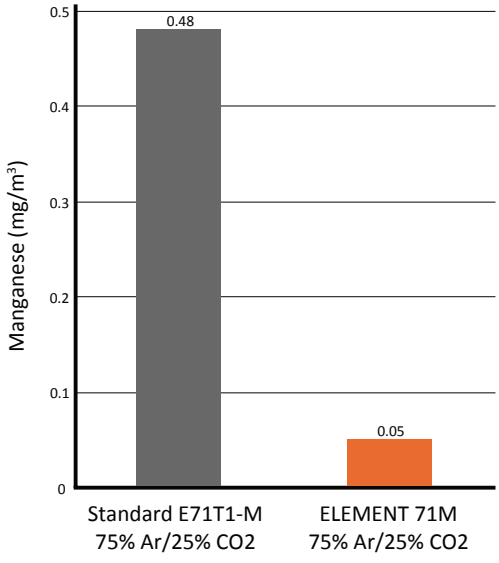
Element wire offers the most comprehensive line of filler metals in the industry that are designed to reduce manganese fume emissions in welding. Conversion to Element products may result in a 60-90% reduction in manganese levels when compared to current filler metal fume emissions.

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.

Miller recommends HOBART FILLER METALS

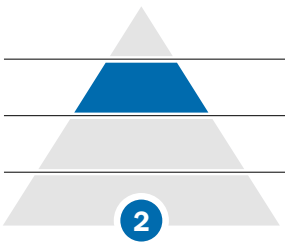
Hobart Element Wire vs. Standard Wire

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



Available Diameters and Packaging

Product	AWS Class	Diameter	Packaging	Part Number
FabCOR® Element™ 71T1C	E71T-1C H8, -9C H8, -12C 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
FabCOR® Element™ 71T1M	E71T-1M H8, -9M H8, -12M 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
FabCOR® Element™ 71C	E71T1-GC H8	.045 in	33 lb Fiber Spool	S297912-029
		.052 in	33 lb Fiber Spool	S297915-029
		1/16 in	33 lb Fiber Spool	S297919-029
FabCOR® Element™ 71M	E71T1-GM H8	.045 in	33 lb Fiber Spool	S294712-029
		.052 in	33 lb Fiber Spool	S294715-029
		1/16 in	33 lb Fiber Spool	S294719-029
FabCOR® 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
FabCOR® 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
FabCOR® Element™ 70C6	E70C-6M H4	0.0045 in	33 lb Fiber Spool	S294612-029
		0.052 in	33 lb Fiber Stool	S294615-029
		0.052 in	60 lb Coil	S294615-002
		1/16 in	33 lb Fiber Stool	S294619-029
		1/16 in	33 lb Fiber Stool	S294619-002



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 systems provides total fume extraction 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.

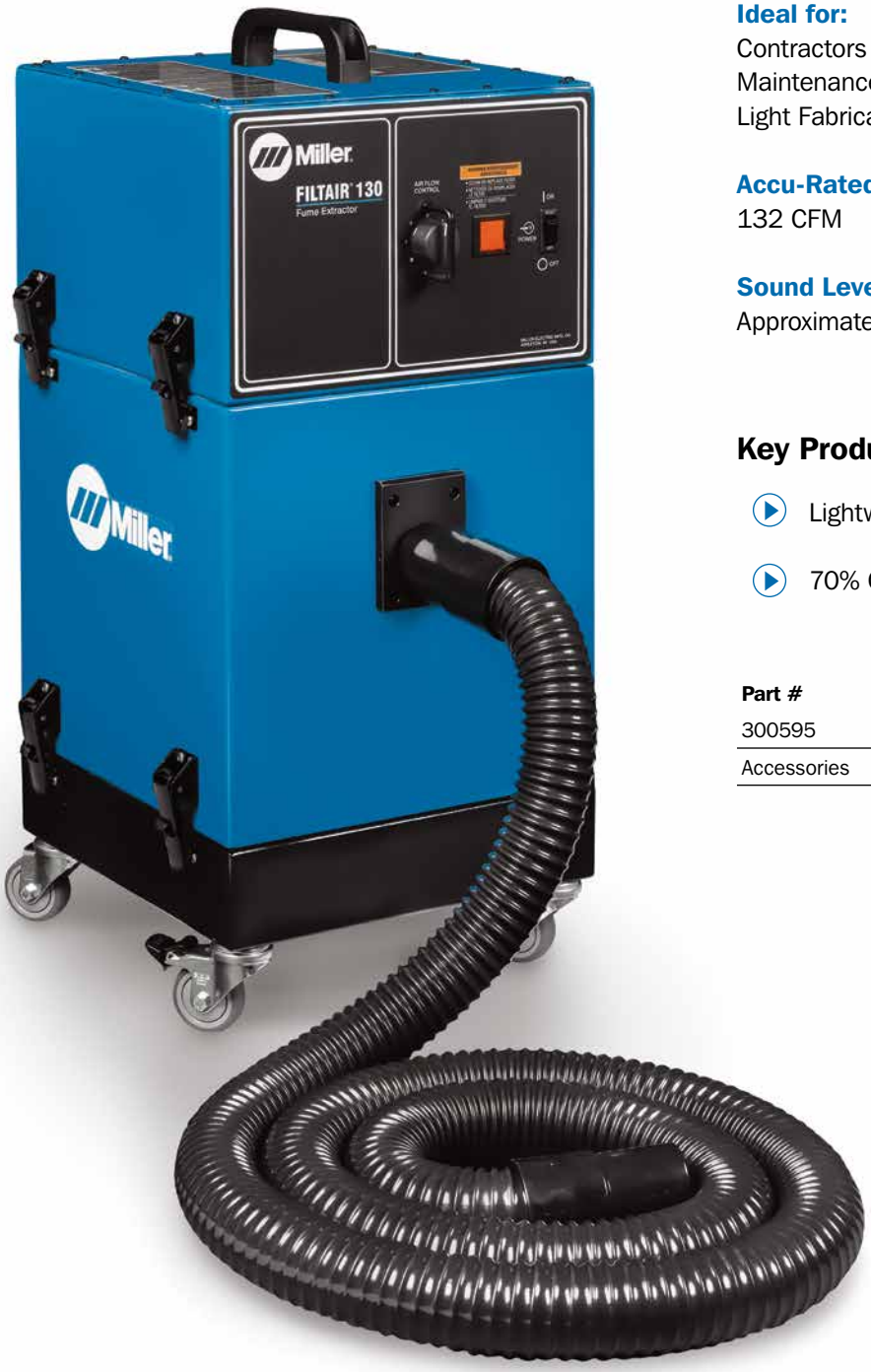
ZoneFlow™: Advanced Miller® technology that creates a negative pressure zone, allowing the weld particulate capture distance to be extended up to five feet deep and three feet wide.

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.

Portable 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:
300595	Model 130 - Includes Filter, 8 ft Hose and 20 ft Power Cord
Accessories	See pg. 19

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.

ZoneFlow™ Technology

Exclusive ZoneFlow™ Technology increases the capture zone by up to 70% compared to traditional equipment, minimizing operator interaction with the arm and helping to ensure proper use.

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.

Mobile Extractors

FILTAIR Capture 5

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

Part #	Description:
951639	208-230 V with 10 ft Pre-Assembled Extraction Arm
951640	230 V with 12 ft Pre-Assembled Extraction Arm
951574	460 V with 10 ft Pre-Assembled Extraction Arm
951575	460 V with 12 ft Pre-Assembled Extraction Arm

FILTAIR® MWX

Mobile weld fume extractors designed to easily move with the welder and work. Features ZoneFlow™ Technology

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.

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	Part #	Description:
MWX-D Packages (Includes mobile extractor, high-efficiency filter and arm)	951507	With 7 ft Extraction Arm and Disposable Filter
	951508	With 10 ft Extraction Arm and Disposable Filter
	951509	With 12 ft Extraction Arm and Disposable Filter
MWX-S Packages (Includes mobile extractor, high-efficiency filter and arm)	951510	With 7 ft Extraction Arm and Self-Cleaning Mechanism
	951511	With 10 ft Extraction Arm and Self-Cleaning Mechanism
	951512	With 12 ft Extraction Arm and Self-Cleaning Mechanism

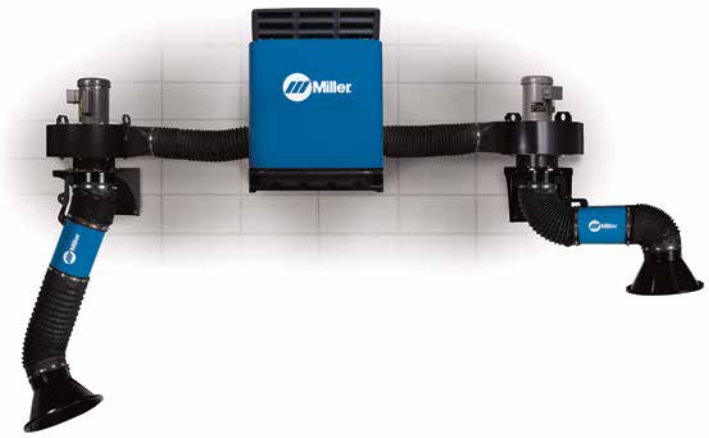
Stationary Extractors

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. Features ZoneFlow™ Technology.

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:

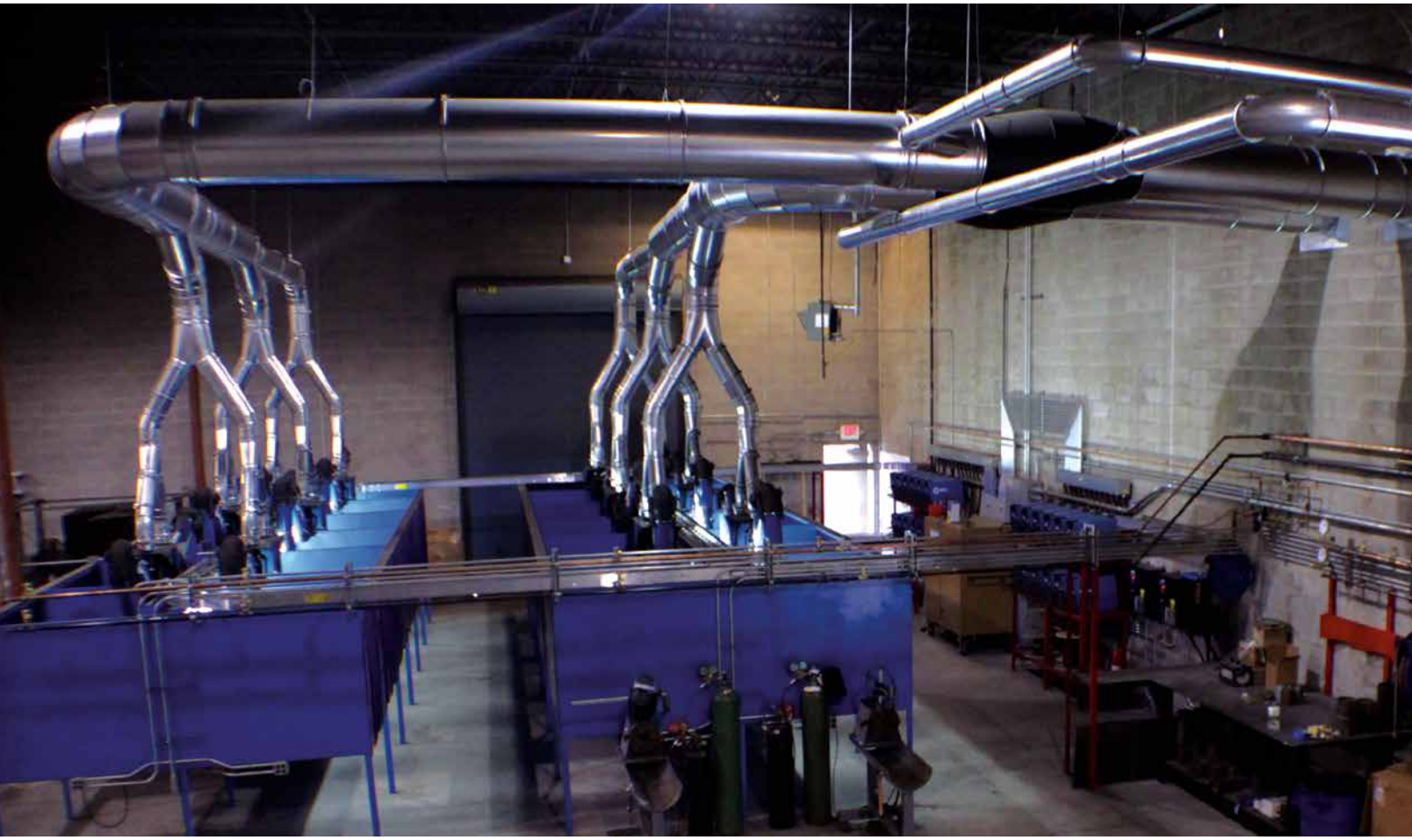
Easy-to-operate, Pre-assembled Extraction Arms
Designed to cover larger spaces. Available in 7-, 10-, and 12-foot lengths. External brackets and adjustments allow air to pass through with less resistance giving you stronger CFM (airflow).

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	Part #	Description:
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.)	951619	With 3–4.5 ft Telescoping Extraction Arm
	951513	With 7 ft Standard Extraction Arm
	951514	With 10 ft Standard Extraction Arm
	951515	With 12 ft Standard Extraction Arm
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, mouting bracket, duct, and 8 in arm. 115 VAC wiring NOT included.)	951620	With 3–4.5 ft Telescoping Extraction Arm
	951516	With 7 ft Standard Extraction Arm
	951517	With 10 ft Standard Extraction Arm
	951518	With 12 ft Standard Extraction Arm
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.)	951621	With 3–4.5 ft Telescoping Extraction Arm
	951519	With 7 ft Standard Extraction Arm
	951520	With 10 ft Standard Extraction Arm
	951521	With 12 ft Standard Extraction Arm



Centralized Extraction Systems

FILTAIR® 4000-12000

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

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

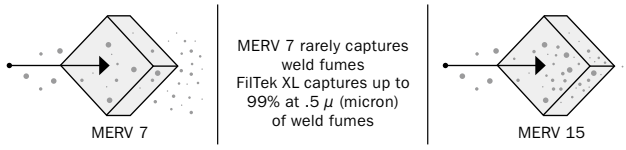
When it comes to selecting a fume extractor, nothing is more important than the filter.

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. Miller FilTek XL filters have the highest MERV ratings in the industry – a class-leading MERV 15 – 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 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:
301242	Telescoping Arm, 6 in Diameter
300953	Standard Arm, 6 in Diameter, 7 ft Arm
300954	Standard Arm, 6 in Diameter, 10 ft Arm
300955	Standard Arm, 6 in Diameter, 12 ft Arm
300952	Arm Mounting Bracket and Ducting Kit, 6 in Diameter
301237	Telescoping Arm, 8 in Diameter
300980	Standard Arm, 8 in Diameter, 7 ft Arm
300981	Standard Arm, 8 in Diameter, 10 ft Arm
300982	Standard Arm, 8 in Diameter, 12 ft Arm
300771	Arm Mounting Bracket and Ducting Kit, 8 in Diameter

SWX Dual-Arm Add-On Packages
951621 With Telescoping Arm
951519 With 7 ft Standard Arm
951520 With 10 ft Standard Arm
951521 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
301267 130 model
300925 400 model

MWX & SWX Replacement Filters
300540 Self-cleaning filter models
300539 Disposable filter models

Capture 5 Replacement Filter
301106

Centralized FilTek® XL Replacement Filter
300927

Flexible Funnel Magnetic Nozzle
300668

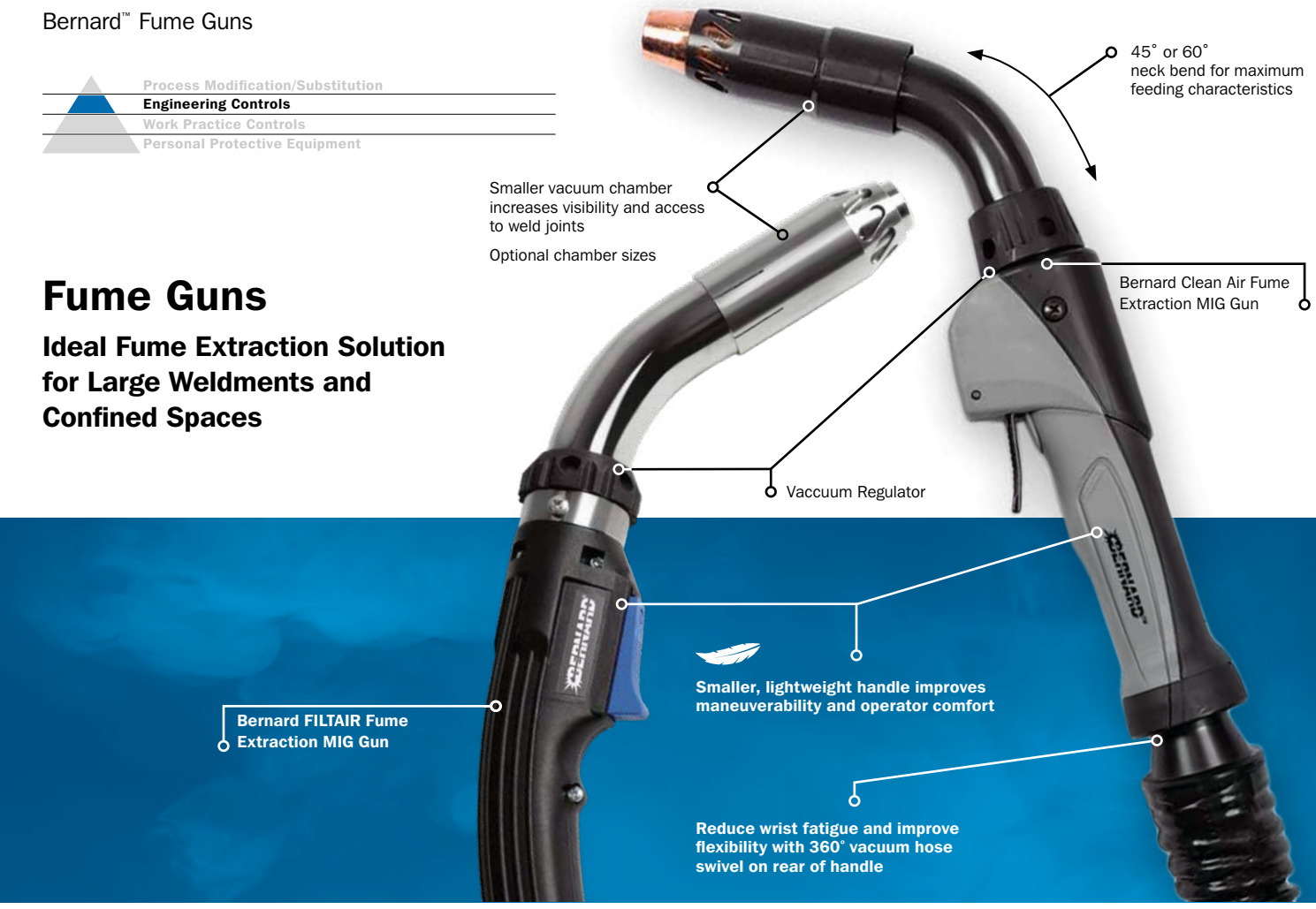
Magnetic Nozzles
300895 11.8 in (300 mm) width

Collection Hose
300896 17 ft (5.2 m)
300897 34 ft (10.4 m)

Hood Light with Arc Sensor
300689 MWX Series
300763 SWX Series
- Illuminates the welding zone and enables the fume extractor to start automatically when welding begins

Fume Guns

Ideal Fume Extraction Solution for Large Weldments and Confined Spaces



Bernard™ Clean Air™ Fume Extraction MIG Gun

Reduce smoke at the source to provide a cleaner, compliant work environment. Designed 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.

Key Product Features:

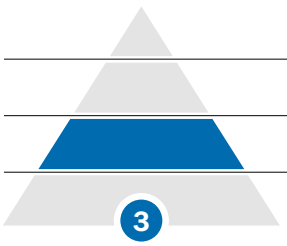
- Available in 300, 400, 500 and 600 amp models
- Lightweight, comfortable and durable design for industrial grade performance
- Nozzle shroud adjusts to one of four positions for optimized fume capture, gas flow and weld access
- Compatible with vacuum systems from most manufacturers
- Suitable for 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

Bernard™ FILTAIR® Fume Extraction MIG Gun

Get to the source and capture weld fume at the front of the gun with 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 300 and 400 amp models
- Protect against porosity with vacuum regulator that balances suction with shielding gas flow
- Compatible with vacuum systems from 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

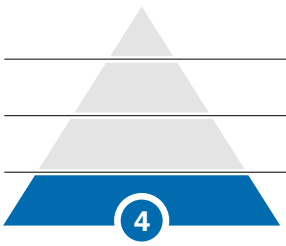
Remove paint or coatings before welding to minimize the release of contaminants

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

Properly set up weldcells and fixtures to minimize operator exposure to fume plumes

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

Improved lens quality lets welder allow more distance between them and the weld, and reduces overwelding



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 operators 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.

MUC = APF x OSHA PEL

WRPP: 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.

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

Part #:	**Description:**
267334-2	N95 Respirator with Valve
267334	N95 Respirator with Valve, 10 Pack
267335-2	N95 Respirator with Valve and Nuisance Level OV Relief[2]
267335	N95 Respirator with Valve and Nuisance Level OV Relief[2], 10 Pack

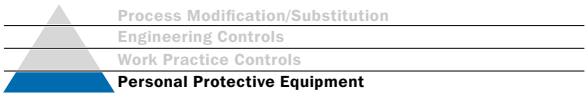
Front View

Back View

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[2]
- 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 Weld-Mask™ 2, maximizing the 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

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
261086	Quantitative Face-Fit Test Kit

When use is mandatory, the Miller N95 and LPR-100 Half Mask Respirators need to be fit tested[1] 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

[1] Fit testing is necessary for mandatory use.
[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.
[3] OSHA-accepted fit test protocols and procedures are contained in 29 CFR 1910.134 Appendix A

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[2]
- 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

[1] 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.

Powered Air Purifying Respirators (PAPRs)

Industrial protection for the most extreme welding applications, our PAPR systems are available with the T94-R™, T94i-R™, 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

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
- Lightweight lithium ion battery provides up to 8 hours of life with no memory retention from frequent charging
- Two batteries included with each system

T94 Key Product Features:

- Well-balanced design reduces torque on neck, increasing all-day wear
- Patent-pending Dualtec™ manifold system optimizes helmet balance and sound
- 6-point air distribution system maximizes cooling through targeted air placement
- Lightweight low-profile blower assembly with integrated shoulder straps reduces lower back strain and fatigue
- Low-profile breathing-tube attachment eases on/off, and flexible tube material eliminates breathing tube snags in work cell

Industry's largest integrated grind shield. Forty-four sq in of clear viewing area for increased helmet-on time and decreased eye injuries.

PAPR Systems:

Part #:	Description:
259385	PAPR with Hard Hat with Titanium 9400
261659	PAPR with Hard Hat with Titanium 9400i with Integrated Grind Shield
264573	PAPR with T94-R
264575	PAPR with T94i-R

Replacement Parts:

Part #:	Description:
235673-2	Filter, Particulate (HEPA) (2 pack)
235673-6	Filter, Particulate (HEPA) (6 pack)
235673-36	Filter, Particulate (HEPA) (36 pack)
235674	Filter, Prefilter (Foam) (6 pack)
268841	Prefilter, Nuisance Level OV Relief (6 pack)
235676	Spark Guard
245818	Grinding Shield (Titanium 9400i)
258974	Grinding Shield Tear-aways (T94) (5 pack)

Accessories:

Part #:	Description:
244151	Belt Extension (adds 18 inches in length)
264582	Leather Belt

T94i™ & T94™

Supplied Air Respirator (SAR)

Industrial protection against weld fume and heat stress, our SAR system is available with the T94i-R™ helmet assembly.

NIOSH 42 CFR 84 Certified	APF = 25	Loose-fitting supplied air purifying respirator	Helmet Lens Certification: Meets ANSI Z87.1+ and CSA Z94.3 Standards

Key Product Features:

- C50 air regulator can be positioned vertically or horizontally to naturally align with body movements
- C50 air regulator can cool air entering the helmet up to 50 degrees Fahrenheit
- Well-balanced design reduces torque on neck, increasing all-day wear
- Patent-pending Dualtec™ manifold system optimizes helmet balance and sound
- 6-point air distribution system maximizes cooling through targeted air placement
- Lightweight low-profile blower assembly with integrated shoulder straps reduces lower back strain and fatigue
- Low-profile breathing-tube attachment eases on/off process while flexible tube material eliminates breathing tube snags in work cell

C50 Air Regulator

T94i Key Product Features:

- ***Clear****Light*™ Lens Technology optimizes contrast and clarity in light and welding states
- Shade 5.0 side windows and integrated grind shield maximize downward and peripheral vision, improving sense of surroundings
- Half shade lens settings provide accurate adjustments for optimized comfort and vision

SAR System:

Part #:	Description:
264871	SAR with T94i-R™

Accessories:

Part #:	Description:
270405	Hose, straight, 25 ft with Industrial Interchange Quick Disconnect
270407	Hose, straight, 100 ft with Industrial Interchange Quick Disconnect
270408	Hose, coiled, 25 ft with Industrial Interchange Quick Disconnect
270410	Hose, coiled, 100 ft with Industrial Interchange Quick Disconnect
270412	C50 air regulator
275983	Two Person BreatheAir Portable Box (10Ppm CO Alarm)
275984	Two Person BreatheAir Portable Box (5Ppm CO Alarm) (Canada)
275985	Four Person BreatheAir Portable Box (10Ppm CO Alarm)
275986	Four Person BreatheAir Portable Box (5Ppm CO Alarm) (Canada)

Four Person BreatheAir™ Portable Box

Straight Air Hose

Coiled Air Hose

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 injuries 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.

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 (ex. safety glasses), per OSHA.

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

STATISTICS & TRENDS: Head & Face

61%

Sixty-one percent of on-the-job eye injuries happen in manufacturing, construction and trade.[3]

$300 Million

Eye injuries alone cost more than $300 million per year in lost production time, medical expenses and worker compensation.[4]

[1] http://science.howstuffworks.com/dictionary/physics-terms/ultraviolet-radiation-info.htm
[2] http://science.howstuffworks.com/infraredradiation-info.htm
[3] US Bureau of Labor Statistics, 2012
[4] 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 (Shade 10)	Auto Darkening	
Shade Type	Fixed Shade	Fixed Shade	Variable Shade
Inactive Shade Coverage	#10	#3 or #4	#3 or #4
Active Shade Coverage	#10	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 source, 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

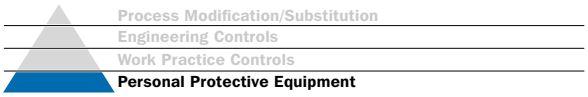
Fixed Shade Lens vs. Variable Shade Lens

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 traditional or bench welding applications.



Eye Protection Against Radiant Energy

Choosing the Right Lens

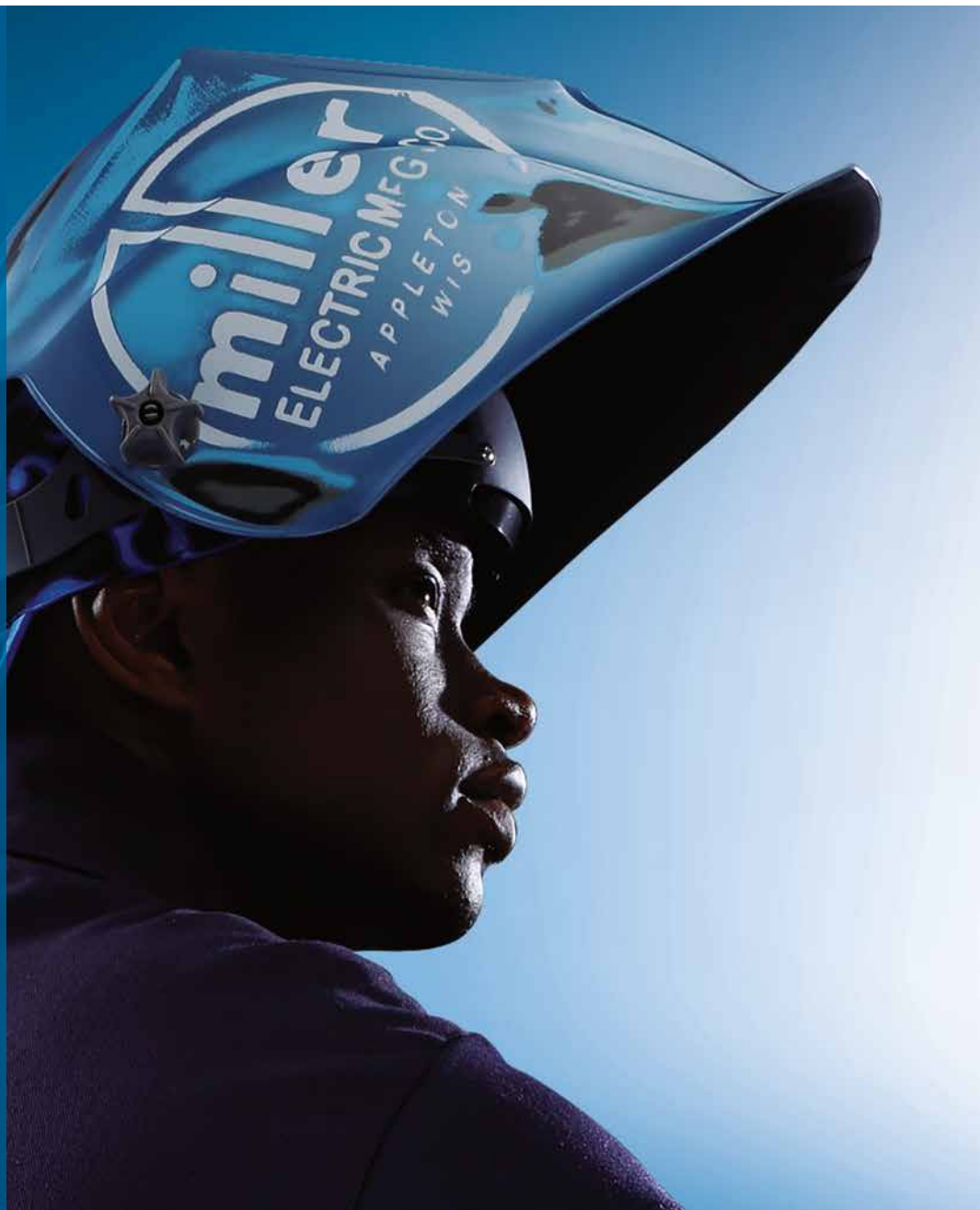
OSHA requires specific eye protection to ensure workers are safe. As a rule of thumb, start with a shade that is too dark to see the weld zone. Then, go to a lighter shade that gives a sufficient view of the weld zone without going below the minimum. During oxygen gas welding or cutting, where the torch 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 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.

Z89.1-2014
Upon request, accessory manufacturers (welding helmets) are required to prove that their components do not cause the hard hat to fail.



Filter Lenses for Protection During Shielded Metal Arc Welding[1]

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)	160-250	10	12
	More than 1/4 in (6.4 mm)	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.

	MP-10™	Classic Series FS#10 Flip-Up	Classic Series Variable Shade	Classic Series VSi™
Viewing Area	16 sq in	5.1 sq in	5.2 sq in	5.15 sq in
***Clear**Light*™ Lens Technology**	No	No	No	No
Shades	Weld: 10	Weld: 10	Weld: 8-12	8-13
Modes	Weld	Weld	Weld	Weld/X-Mode
Integrated Grind Shield	No	Yes	No	Yes
Auto-on	No	Yes	Yes	Yes
Sensors	-	2	2	3
TIG Rating	-	20 amps	20 amps	5 amps/below
Switching Speed	-	1/3,600	1/10,000	1/20,000
Digital Controls	No	No	No	No
Premium Headgear	No	No	No	No
InfoTrack™	No	No	No	No
Weight	18 oz (510 g)	14 oz (396 g)	16 oz (454 g)	23 oz (652 g)

	Digital Performance™	Digital Elite™	Digital Infinity™ Largest in Industry!	T94™
Viewing Area	7.2 sq in	9.2 sq in	13.4 sq in	9 sq in
***Clear**Light*™ Lens Technology**	Yes	Yes	Yes	Yes
Shades	Grind: 3 Cut: 5-8 Weld: 8-13	Grind: 3 Cut: 5-8 Weld: 8-13	Grind: 3 Cut: 5-8 Weld: 8-13	Grind: 3 Cut: 5-8 Weld: 8-13
Modes	Weld/Cut/Grind	Weld/Cut/Grind/X-Mode	Weld/Cut/Grind/X-Mode	Weld/Cut/Grind/X-Mode
Integrated Grind Shield	No	No	No	No (T94) Yes (T94i)
Auto-on	Yes	Yes	Yes	Yes
Sensors	3	4	4	4
TIG Rating	5 amps	5 amps/below	5 amps/below	3 amps/below
Switching Speed	1/20,000	1/20,000	1/20,000	1/20,000
Digital Controls	Yes	Yes	Yes	Yes
Premium Headgear	Yes	Yes	Yes	Yes
InfoTrack™	No	No	Yes - 1.0	Yes - 2.0
Weight	17 oz (482 g)	18 oz (510 g)	22 oz (624 g)	**T94** 21.1 oz (595 g) **T94i** 26 oz (737 g)

X-Mode™ electromagnetically senses the weld to eliminate sunlight interference and continuously detects the arc even when sensors are blocked.

InfoTrack™ Data Monitoring Technology tracks arc time and features a clock. Version 2.0 adds arc count.

MP-10™ Series

Best-in-class traditional passive helmet.

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

Large
Viewing Area

Viewing Area: 16 sq in

Arc Sensors: N/A

Operating Modes: N/A

Weight: 18 oz

Part #:	Description:
238497	Black (Each)
770246	Replacement Ratchet Headgear

Black

Classic Series

Helmets for the value-minded welder.

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

2 YEAR WARRANTY

Auto On/Off

X-Mode*
*VSi only

Black - Variable Shade

Black - FS#10 2x4 Flip-Up

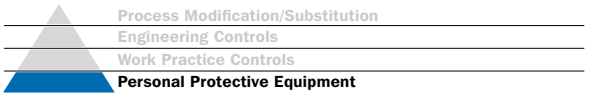
Black – VSi

Rise™

Metalworks™

Viewing area, operating modes and weight differ by model. See chart on page 36 for more information.

Part #:	Description:
251292	Black – Variable Shade
263038	Black – FS#10 2x4 Flip-Up
260938	Black – VSi
271346	Metalworks™
271349	Rise™
770246	Replacement Headgear



*Clear*Light™ Lens Technology

High-definition optics for precision arc recognition

See what you've been missing.

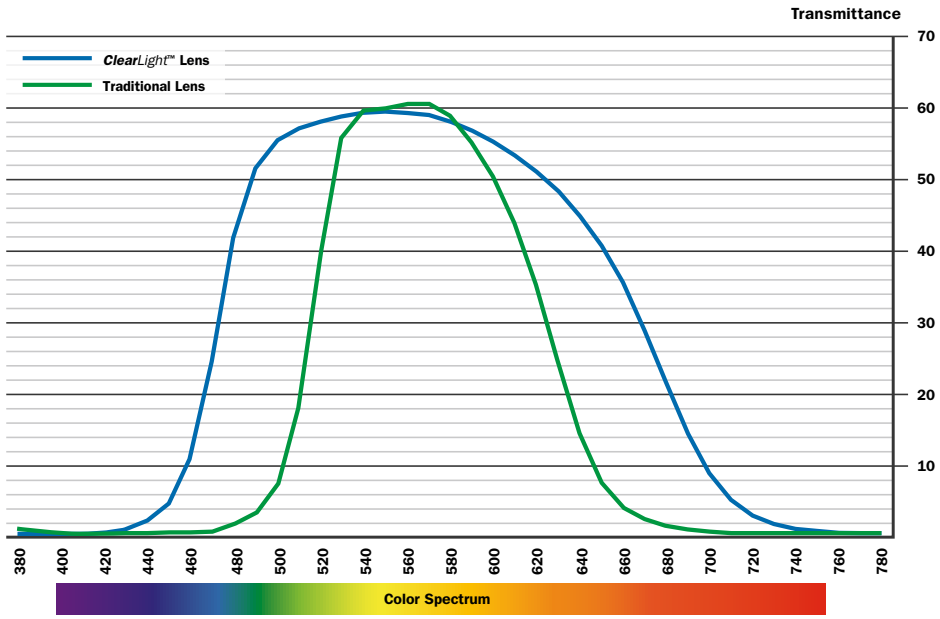
Designed by welders, for welders – ***Clear***Light™ Lens Technology is engineered to complement the colors emitted from the welding arc, enhancing clarity and natural color so that you can see more detail. Having confidence in what you see allows you to perform at a higher level, creating better welds with less rework.

Now available in T94™, Digital Infinity™, Digital Elite™ and Digital Performance™ Series helmets.

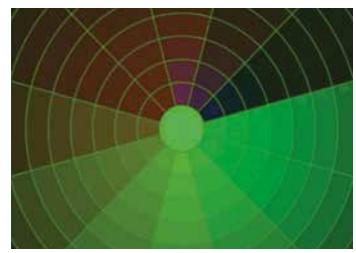
ClearLight™ Lens Technology

LENS TINT MATTERS

- When developing ***Clear****Light*™ Lens Technology our goal was to be sure our lens tint fell within a specific parameter on the color bandwidth, allowing more colors of the spectrum to come through the lens for natural, accurate tones.
- Many other lenses have an artificial blue or yellow tint to them, which doesn't provide as much contrast and clarity, and can lead to increased eye fatigue.



Clear*Light*™ Lens Technology



Traditional Lens Technology

BRIGHTNESS COUNTS

- Auto-darkening welding lenses block light even when a welder isn't striking an arc. ***Clear****Light*™ Lens Technology is designed to minimize light blockage – giving welders a brighter light state to see their surroundings.
- Our 1/1/1/2 optical clarity rating provides a 3.0 light state that allows welders to keep the helmet down in between welds and for non-welding tasks, increasing productivity and helping to prevent eye injuries.

Clear*Light*™ Lens Technology

Traditional Lens Technology

Digital Performance™ Series

Lightweight helmet with superior headgear for ultimate comfort.

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

Viewing Area: 7.2 sq in

Arc Sensors: 3

Operating Modes: 3 – Weld, Cut, Grind

Weight: 17 oz

Part #:	Description:
282000	Black
282001	Blue Rage™
282002	'64 Custom™
256174	Replacement Headgear

Black

Blue Rage™

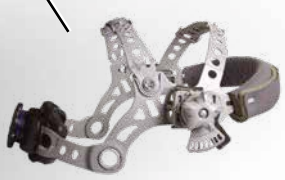
64 Custom™

***Clear**Light*™ Lens Technology

Enhanced Headgear

Digital Controls

Auto On/Off



Flexible, ergonomic design provides enhanced support and stability.

Digital Elite™ Series

Industry-leading helmet provides high-performance versatility.

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

Viewing Area: 9.2 sq in

Arc Sensors: 4

Operating Modes: 4 – Weld, Cut, Grind & X-Mode™

Weight: 18 oz

Part #:	Description:
281000	Black
281001	Lucky's Speed Shop™
281002	Stars and Stripes™ III
281003	Inferno™
281004	Vintage Roadster™
281006	Cat® - 1st Edition
281007	Raptor™
256174	Replacement Headgear

Black

Lucky's Speed Shop™

Stars and Stripes™ III

Inferno™

Vintage Roadster™

Cat® - 1st Edition

Raptor™

Flexible, ergonomic design provides enhanced support and stability.

***Clear**Light*™ Lens Technology – Provides a hi-definition, natural color view that leads to reduced eye strain, better welds and less rework.

Enhanced Headgear

Digital Controls

X-Mode™

Auto On/Off

Digital Infinity™ Series

Industry's largest viewing area maximizes visibility.

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

Viewing Area: 13.4 sq in

Arc Sensors: 4

Operating Modes: 4 – Weld, Cut, Grind & X-Mode™

Weight: 22 oz

Part #:	Description:
280045	Black
280047	Black Ops™
280048	Departed™
280049	Stars and Stripes™
282007	Cat® - 2nd Edition
271325	Replacement Headgear with Comfort Cushion

Black

Black Ops™

Departed™

Stars and Stripes™

Cat® - 2nd Edition

Oversized comfort cushion provides unsurpassed comfort and stability

Black Ops™

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.

***Clear**Light*™ Lens Technology

Enhanced Headgear

Digital Controls

X-Mode™

Auto On/Off

T94™ Series

Maximized comfort, visibility and productivity for the professional welder.

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

T94™

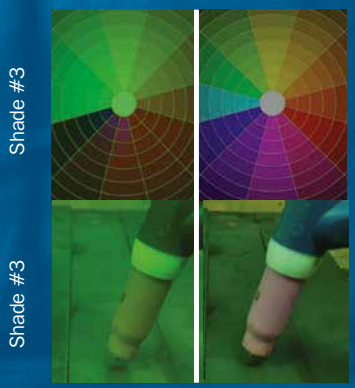
T94i™

Part #:	260482
Viewing Area:	9 sq in
Arc Sensors:	4
Operating Modes:	4 – Weld, Cut, Grind & X-Mode™
Weight:	21.1 oz
Integrated Grinding Shield:	No
External Grind Button:	Yes

Part #:	260483
Viewing Area:	9 sq in (ADF); 44 sq in (Clear Grind Shield)
Arc Sensors:	4
Operating Modes:	4 – Weld, Cut, Grind & X-Mode
Weight:	26 oz
Integrated Grinding Shield:	Yes
External Grind Button:	No

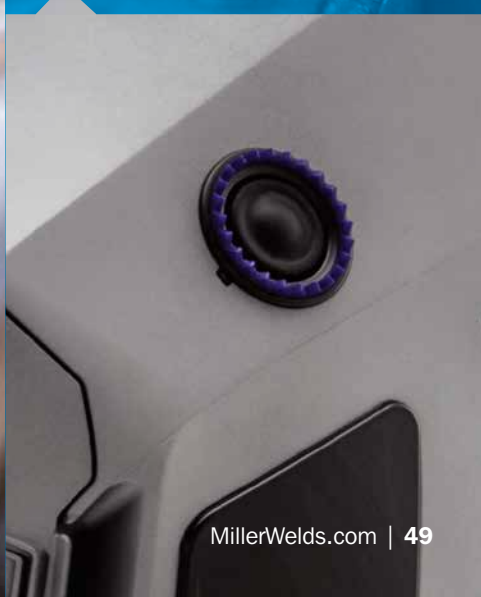
***Clear**Light*™ Lens Technology – High-definition optics for precision arc recognition.

Traditional Lens Technology VS ***Clear**Light*™ Lens Technology



T94i™ Clear Grind Shield – Maximizes downward and peripheral visibility

T94™ External Grind Mode – Switch to grind mode with the push of a button



Weld-Mask™

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

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

Part #:	Description:
267370	Weld-Mask™
280982	Weld-Mask™ 2

Overall Key Product Features:

- Compact auto-darkening lenses allow users to weld in spaces where access with traditional welding helmets is limited.
- Soft close-fitting eye covering provides total darkness for precision welding.
- Face shield and flame-resistant head cover provide coverage for UV/IR rays and applications with limited spatter.
- Ideal for use with hard hats. Both Weld-Mask models fit under a hard hat without the need of an adapter.

Weld-Mask Additional Features:

- Ideal for auto restoration and other DIY environments. Narrow design provides protection without getting in the way.
- Shades 5, 7, 9, 11 and 13 for use with MIG, TIG, stick, and gas welding and cutting.
- Extremely lightweight (7.8 oz), virtually eliminates neck strain.

Weld-Mask™

Weld-Mask 2 Additional Features:

- Ideal for industrial or construction environments. Can be worn with a Miller® Half Mask Respirator and Miller® Classic safety glasses.
- Shades 5-13 for use with MIG, TIG, stick, and gas welding and cutting.
- Wide singular lens provides unmatched auto-darkening range of visibility.
- X-Mode™ electromagnetically senses the weld to eliminate sunlight interference and continuously detects the arc even if sensors are blocked.

X-Mode™
(Weld-Mask 2 only)

Flashlight accessory* converts your Weld-Mask 2 into a headlamp, freeing both hands for welding

Miller LPR-100 Half Mask respirator* and Classic safety glasses* seamlessly fit under Weld-Mask 2 for added safety and compliance

*Items sold separately

Weld-Mask™ 2

External controls for quick and convenient access

Lightweight design virtually eliminates neck strain

Accessories

Weld-Mask

Part #:	Description:
267420	Front Cover Lens
267421	Weld-Mask™ FR Head Cover*
270055	CR2032 Replacement Battery

Weld-Mask 2

Part #:	Description:
280985	Front Cover Lens
280983	Weld-Mask 2 FR Head Cover*
217043	CR2450 Replacement Battery

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

Helmet Consumables

Cover Lenses

Part #:	Description:	Quantity:
231411	Front: Classic, Classic VS, Pro-Hobby	5 pkg
231410	Inside: Classic, Classic VS, Classic VSi, Pro-Hobby	5 pkg
231921	Front: Performance	5 pkg
770237	Inside: Performance, Titanium 7300, 2x4 Flip-Up	5 pkg
216326	Front: Elite, Titanium 1600, Titanium 1600i, Titanium 7300, Titanium9400, Titanium 9400i, MP-10	5 pkg
216327	Inside: Elite, Titanium 9400, Titanium 9400i	5 pkg
271320	Front: Infinity	5 pkg
271319	Inside: Infinity	5 pkg
235628	Inside: Titanium 1600i, MP-10 Front: Classic VSi	5 pkg
261830	Grind Shield: 2x4 Flip-Up	
265304	Front: T94, T94i	5 pkg
216327	Inside: T94, T94i	5 pkg
258979	Grind Shield: T94i	
245818	9400i & VSi Replacement Grind Shield	
260197	Side Window Covers: T94, T94i	

Bulk Cover Lenses

Part #:	Description:	Quantity:
216326B	Front: Elite, Titanium, MP-10	50 pkg
216327B	Inside: Elite, Titanium, 9400i	50 pkg
231921B	Front: Performance	50 pkg
770237B	Inside: Performance	50 pkg
231411B	Front: Pro-Hobby, Classic	50 pkg
265304B	Front: T94, T94i	50 pkg
216327B	Inside: T94, T94i	50 pkg

Magnifying Lenses

Part #:	Magnification:	Part #:	Magnification:
212242	2.5	212237	1.25
212241	2.25	212236	1.00
212240	2.00	212235	.75
212239	1.75		
212238	1.5		

Head & Face Accessories

Slotted Hard Hat Adapter
259637

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

Halo Hard Hat Adapter
213110 (XL and XLi Series)
222003 (Titanium, XLix, Elite, Performance, ProHobby, Classic and MP-10 Series)
265315 (T94 Series)

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

Helmet Hook
251018

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

Miller recommends MSA The Safety Company

Fabric Headband
770249

Lithium Battery - CR2450
217043

T94 Helmet Bib
279078

- Flame-resistant material provides additional neck coverage

T94™ Helmet Cape
279080

- Flame-resistant material provides additional back-of-neck coverage

Helmet Bib
253882

- WeldX™ helmet bib provides added protection
- Velcro® attachment
  Fits all series except T94

Job-Site Tool Bag
228028

- Unzipped bag opening: 12 x 18-1/2 in
- Padded shoulder strap
- Over 20 separate pockets

Helmet Bag with Miller® Logo
770250

- Drawstring closure
- Ultra-soft inside liner
- Exterior storage pouch

2x4 Auto-Darkening Lenses
770660 (Shade 8)
770659 (Shade 9)
770226 (Shade 10)
770961 (Shade 11)

- Auto-On/Auto-Off
- Light state shade #3
  Fits all 2x4 inch windows. 2-year warranty

Headgear - Gen 1
770246

Headgear - Gen 2
256174

Headgear - Gen 3
271325

Headgear - Gen 4
260486

Safety and Cutting Glasses

Meets ANSI Z87.1+ 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	272187
Classic with Strap	Clear	272188
Spark™	Clear	272190
Spatter™ - Black	Clear	272191
	Smoke	272195
Spatter™ - White	Clear	272198
	Smoke	272199
Slag™ - Black	Clear	272201
	I/O	272202
	Smoke	272203
	#3	272204
	#5	272205
Slag™ - White	I/O	272207
	Smoke	272208
	#3	272196
	#5	272209

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.

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 800º 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.

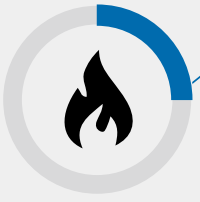
The Statistics: Hand & Body

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 Z49.1[1]

- 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.

[1] http://www.aws.org/technical/facts/FACT-33.pdf


The Power of Blue®

Welding Gloves

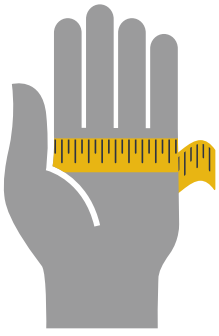
Although extremely preventable, hand injuries are a common workplace injury. The number one reason workers remove hand protection is due to discomfort[1]. Miller gloves are designed using a three-dimensional pattern to provide an excellent fit, resulting in unprecedented comfort and dexterity – keeping 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	• High heat resistance, does not melt • 2 ½ times stronger than nylon or polyester thread • Has little to no stretch for a tight seam	• Best heat protection • Thicker, with somewhat limited dexterity • Designed for higher heat and cold weather applications • Wicks Moisture	• Good for medium - to heavy-stick welding applications • Cotton absorbs moisture • Foam protects against heat	• Maximum dexterity • Maximum moisture absorption	• Reflects radiant heat for high heat handling

Component	Exterior					
Material	Cowhide	Deerskin	Pigskin	Goatskin	Sheepskin	Silicone
Feature	• Most versatile • Various grades and grains available, which affects pliability and strength • Ideal for Stick and MIG welding and handling	• Extremely soft • Snug fit provides maximum dexterity • Ideal for TIG welding and lighter-duty handling	• Soft and durable • Naturally resistant to moisture • Extremely breathable • Ideal for Stick and MIG welding and handling	• Greatest tensile strength for weight • Resistant to scraping and rubbing • Ideal for TIG and MIG welding and handling	• High dexterity rating • Smooth surface for wire handling • Ideal for TIG welding	• Strong and durable • Resists temperature extremes, oxidation and ultraviolet radiation • Withstands up to 660˚ F • Repels moisture

[1] http://www.ishn.com/articles/print/98084-taking-off-the-gloves-theres-no-reason-for-noncompliance

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

Double-layered insulated pig skin palm provides extreme durability and protection

Strategically placed patches on palm and back for extended glove life

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

Performance Gloves

Unprecedented comfort and performance with exceptional dexterity and flexibility.

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

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

TIG

- Completely unlined for heightened feel and dexterity
- Triple 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

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

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

TIG/Multitask

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

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

See page 63 for sizing and part number information

Classic Gloves

Traditional design for the value-minded welder.

Heavy-Duty MIG/Stick

- Reflective insulation on back reduces heat impact
- Moisture-wicking fleece and foam insulation
- Pig grain palm, pig split back and cuff

MIG-Pigskin

- Reinforcement patches enhance durability
- Moisture-wicking fleece and foam insulation
- Pig split leather palm, back and cuff

MIG-Cowhide

- Reinforcement patches enhance durability
- Moisture-wicking fleece and foam insulation
- Goat split palm, pig split back and cuff

TIG

- Thin internal padding for added comfort
- Unlined palm for precise dexterity
- Sheep grain palm, goat split back, pig split cuff

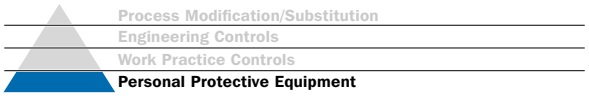
Classic Gloves

	M	L	XL	2XL
Extra Heavy Duty MIG/Stick	–	271877	271887	–
MIG-Pigskin	–	271888	271889	–
MIG-Cowhide	–	271890	271891	–
TIG	271892	271893	271894	–

Performance Gloves

	XS	S	M	L	XL	2XL
Heavy Duty MIG Stick (Long Cuff)	–	–	–	–	263342	–
Heavy Duty MIG Stick	–	–	–	263339	263340	269615*
MIG/Stick	–	–	–	263343	263344	269616*
MIG (Lined)	–	–	263332	263333	263334	269618*
TIG	263345	263346	263347	263348	263349	–
TIG/Multitask	–	263352*	263353*	263354*	263355*	–
Work	–	–	266041	266042	266043	–
Metalworker	–	–	251066*	251067*	251068*	–

*Sold as 6 packs



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


Miller
Miller

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

	S	M	L	XL	2XL	3XL	4XL	5XL
Part #	244749	244750	244751	244752	244754	244755	244756	244758
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

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

Classic FR Cotton

Classic FR Cotton Apron

247149

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

Classic FR Cotton Sleeves

247148

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

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

Men's Jacket

Women's Jacket

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
- 30 inch torso length

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

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

	M	L	XL	2XL
Part Number	258097	258098	258099	258100
Chest Width	48 in	52 in	56 in	60 in
Sleeve Length	33 in	34 in	35 in	36 in
Shoulder Width	19 in	20 in	21 in	22 in

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

	M	L	XL	2XL
Part Number	264380	264381	264382	264383
Shoulder Width	16 in	18 in	19 in	20 in
Chest Width	21 in	23 in	25 in	26 in
Sleeve Length	33 in	34 in	36 in	38 in
Torso Length	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
- 30 inch torso length

Combo Sleeves

231096

- 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

231125

- 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	231080	231081	231082	231083	231084	231085	231086	231087
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

MEDIUM DUTY

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

	S	M	L	XL	2XL	3XL	4XL	5XL
Part #	247114	247115	247116	247117	247118	247119	247120	247121
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

WeldX™ Cape Sleeves

- 7 oz WeldX front and sleeves combined with 9 oz Flame-resistant Navy cotton back provide optimal protection
- Miller bib accessory can be attached along the chest
- Barracuda style stand-up collar for extra neck protection
- Pre-shrunk fabric
- "Fold-in" sleeve snaps for a better fit around the wrist]

WeldX™ Bib

247133

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

WeldX™ Cape Sleeves Part Numbers

	S	M	L	XL	2XL	3XL	4XL	5XL
Cape Sleeves	247122	247123	247124	247126	247127	247128	247130	247131

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

Grain 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
- 30 inch torso length

Grain Leather Jacket Sizing & Part Numbers

	L	XL	2XL
Part Number	231090	231091	231092
Chest Width	52 in	56 in	60 in
Sleeve Length	34 in	35 in	36 in
Shoulder Width	20 in	21 in	22 in

Key Product Features:

- Premium pig split leather
- Sewn entirely with Kevlar® thread for added durability at each seam

Split Leather Jacket

- Extended rear tail for additional protection
- “Expandable” leather strategically placed for optimal mobility
- Mesh lining for comfort and breathability
- Sewn entirely with Kevlar® thread, adding structural durability at each seam

Split Leather Jacket Sizing & Part Numbers

	S	M	L	XL	2XL	3XL	4XL	5XL
Part Number	273212	273213	273214	273215	273216	273217	273218	273219
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®, WeldX™
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, 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.

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.

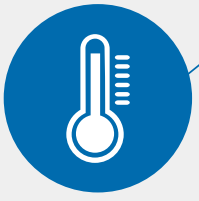
Body Heat Balance: Steady state equilibrium between body heat production and heat loss to the environment.

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.

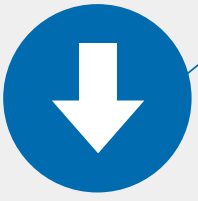
Threshold Limit Values (TLV): Guidelines designed for use by industrial hygienists in making decisions regarding safe levels of exposure to various chemical substances and physical agents found in the workplace.

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

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.

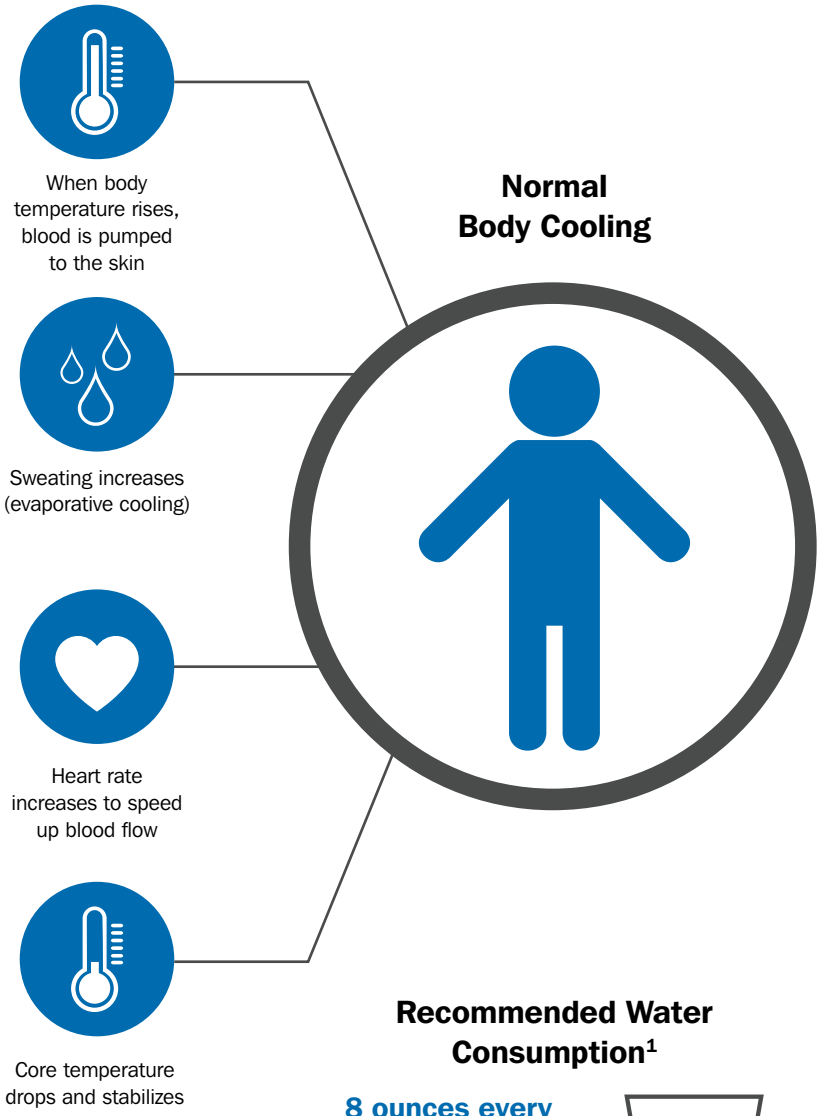
Know the symptoms

- 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 Consumption[1]

8 ounces every 15 to 20 minutes

During moderate activity in moderately hot conditions

Types of Heat Stress[1]

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[2]
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

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.

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.

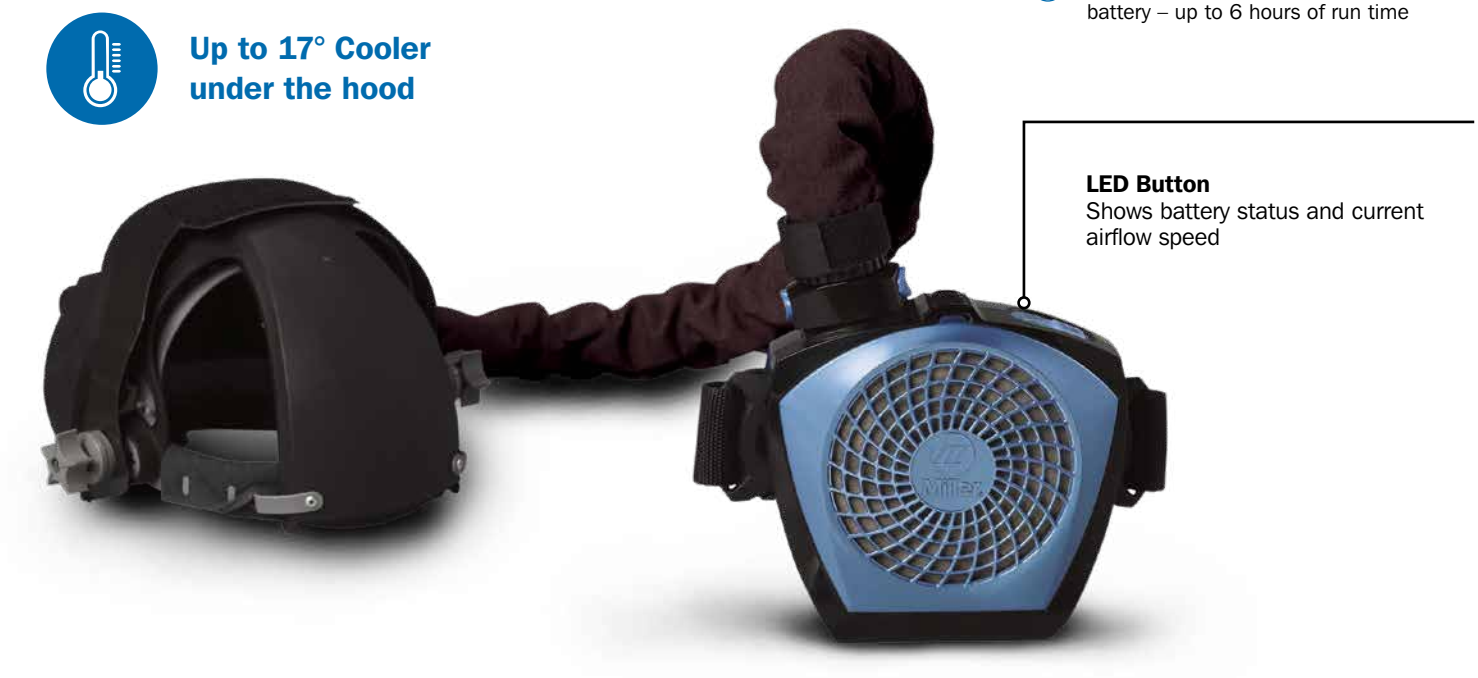
Part #:	Description:
245230	CoolBelt

** 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

Up to 17° Cooler under the hood



LED Button
Shows battery status and current airflow speed

By cooling a worker 15 degrees, they will make approximately 90% fewer errors[1]

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

(Number of heat-related errors at 95 degrees)
x (cost of fixing errors)
x .90

= Total Potential Savings of Reducing Heat Related Errors

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

Contents

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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