STEEL MILL

HAND SAFETY GUIDE

V 1.0

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1. INTRODUCTION

Hand injuries are the #1 preventable injury across the world.

Injuries in steel mills are commonly caused by exposure to heat and hot surfaces from molten metal and billets, handling chemicals and solvents used in the smelting process, and mechanical hazards posed by operating equipment and machinery. According to the US Bureau of Labor Statistics, in 2019, the incidence rate of nonfatal injuries in steel foundries was 9.7 per 100 workers—the highest for all types of metal casting.

Many hand injuries often go unreported but still affect both business and employees. Even injuries that are not categorized as lost time can have a significant effect on production, productivity, and on a worker's quality of life.

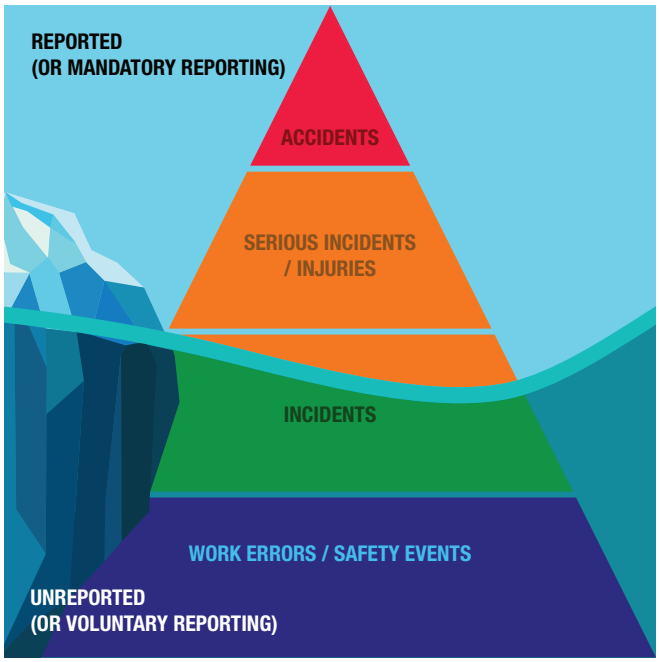

Fig. 01

2. GUIDE USE AND APPLICATION

This guide provides employers, workers, and others with practical information to improve hand safety. You should always start with an assessment of hazards to workers' hands which, once identified, should be reduced or eliminated by following the hierarchy of controls (See section 4). If personal protective equipment (PPE) gloves will be used to minimize the risk, glove trials should be conducted along with worker training.

3. OHS LEGISLATION

Employers and workers should refer to the Occupational Health and Safety (OHS) Legislation in their region for a full understanding of their responsibilities for hand safety and PPE. Compliance with the regulations is mandatory and being unaware of them cannot be used as a defense for non-compliance.

This guide collects the industry's best practices to promote hand safety beyond the minimum regulatory requirements. We encourage employers to set standards that exceed regulation, advance industry best practices, and supports a culture of safety.

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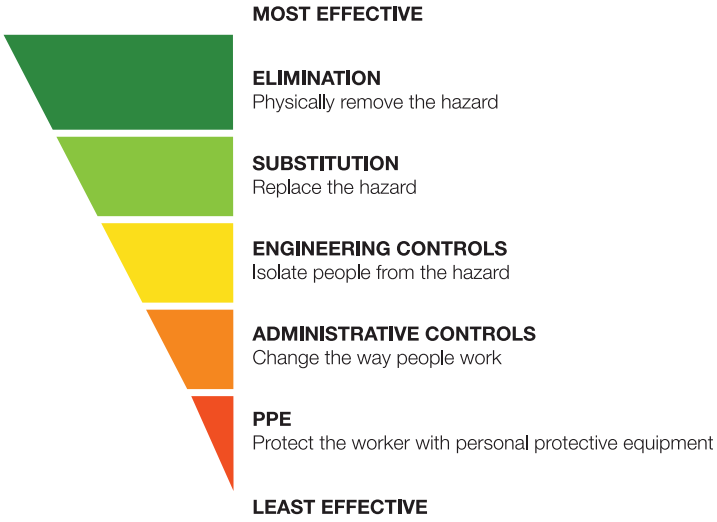
4. HAZARD ASSESSMENTS

Job and field level hazard assessments are opportune times to identify hand dangers using the hierarchy of safety controls. Listed by priority, from most effective to least, the safety controls are elimination, substitution, engineering controls, administrative controls, and personal protective equipment (PPE).

To address the risks to hands more fully, hazard assessments must describe the nature of the hazards. These include spinning or moving parts, repetitive manual handling, abrasion, punctures, cuts, heat and cold, etc.

PPE is the last line of defense. Hand safety is more than just wearing gloves, it is preventing risks to hands in the first place.

HIERARCHY OF CONTROLS



5. SAFE WORK PRACTICES / SAFE JOB PROCEDURES

Employers should establish safe work practices (SWP) and safe job procedures (SJP) to address significant hazards or risks for routine tasks. SWP outlines the safety procedures of how to perform a task with minimum risk to people, equipment, materials, environment, and processes. SJP are the series of specific steps that guide a worker to complete a task from start to finish. Both SWP and SJP should also detail what types of gloves are required. Together, they reduce risk by minimizing potential exposure to dangers in performing a task.

It is management's responsibility to provide training for workers to follow these practices or procedures. Both management and workers should be involved in developing safe work practices.

6. FOSTERING SAFETY CULTURE AND DECISION MAKING

While hazard assessments, safe work practices, and operating instructions are important to guide and keep workers safe, they often reflect optimistic work conditions. Workers seldom operate in the ideal environments that these instructions were developed for, challenging workers and supervisors to balance the competing pressures of schedule, quality, cost, and safety. They are often reduced to doing their best to satisfy the pressures of one or more at the expense of sacrificing the others.

Employers who foster a culture of safety and have systems to help workers assess hazards will better balance these pressures and reduce lost time due to accidents. Employers will be rewarded with more engaged employees, higher productivity, and fewer incidents when workers are trained to exercise good judgment and are treated fairly when mistakes happen.

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7. TRAINING AND COMPETENCY

For workers to be competent in the health and safety aspects of their work, they must possess the following:

- Be qualified to do the assigned work by having the appropriate knowledge, training, and experience
- Have knowledge of the hazards and risks associated with the job or tasks
- Able to recognize, evaluate, and control these hazards and risks by knowing which precautions to take or which controls to use / have been put in place
- Able to work in a way that won't place their or others health and safety in danger
- Have knowledge of the laws and regulations that apply to the work being done

For more information about legislation and the requirement(s) to be competent, always check with your jurisdiction for the exact legal interpretations.

Two effective and easy-to-use training concepts to prevent hand injuries include:

Hand placement training – this is very specific task training that is usually done 1-on-1. It models hand placements, illustrates why hands need to be placed correctly, and what the risks are if placed incorrectly.

Tool Box Talks – a group discussion on a specific topic. Here are some samples of areas that can be covered:

- Discuss hazards and brainstorm potential ways to eliminate, substitute, or change work processes to increase hand safety
- Demonstrate and discuss how to use and handle equipment safely and properly
- Discuss how to communicate with each other on a job site when noisy, through varied weather, or through ever-changing site conditions

Hand placement: Think about the best placement of your hands to avoid injuries from hazards.

- Discuss how and when to use personal protective equipment (We designed many of the role pages in this guide for use as a Tool Box Talk)

It is also vital to monitor and follow up, verifying that training was effective and has contributed to improving worker performance. Manufacturers and suppliers typically have useful information and training that can be tailored for individual employer use.

Sources: CCOHS website https://www.ccohs.ca/oshanswers/legisl/competent.html, Superior Glove Hand Safety Training, and ReThinking Hand Safety

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8. WORKPLACE INSPECTIONS

Workplace inspections are an opportunity to talk with workers and supervisors to listen to their hand safety concerns. Important things to discuss with workers include:

- Are workers getting the right gloves for the tasks / hazards / environmental conditions?
- Are the gloves effective at protecting workers' hands?
- Are workers getting the right sizes of gloves?
- Is there a supply of gloves available at the work location for when they need to be replaced?
- Is there anything that could be done to improve hand safety?

Important things to look for include:

- Verifying workers gloves are not being worn past their service life. If replacement gloves are not readily accessible, workers will continue wearing compromised gloves putting their hands at risk
- Verifying workers remove gloves when they can be a hazard around tools and equipment due to entanglement hazards

Who conducts inspections can be very important to identifying system weaknesses and recommending improvements. Consider the benefits of including management, manufacturers, suppliers, and Occupational Health and Safety (OHS) Inspectors in your workplace inspections.

- The more management understands and appreciates the challenges faced by workers, the more capable they will be of assisting workers in doing their tasks safely
- Manufacturers and suppliers understand their products best. Incorporate them in your workplace inspections
- Despite the fear some employers and workers have for OHS Inspectors, they share similar responsibilities and goals of ensuring safe workplaces. Invite your OHS Inspector to your workplace for an inspection. Take advantage of their knowledge and experience, having them share their opinions on workplace safety

Effective workplace inspections will result in a higher level of engagement and understanding of the work, improving safety and productivity.

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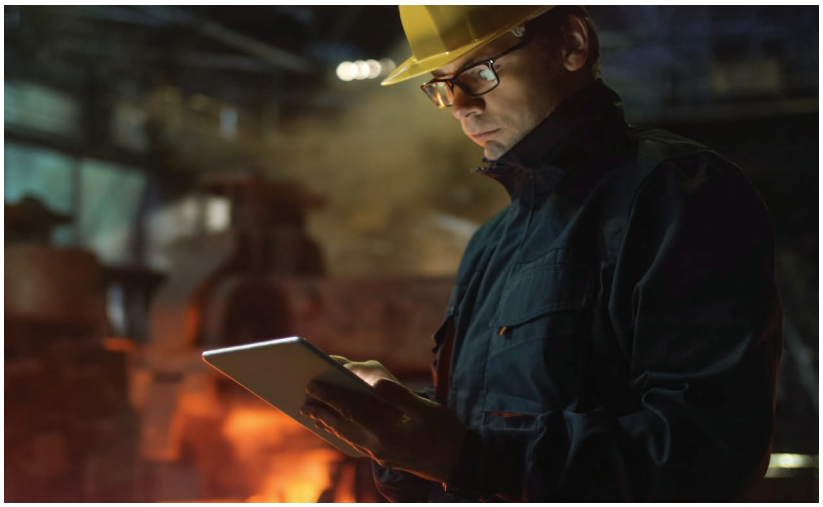
9. INCIDENT REPORTING AND INJURY TREATMENT

Learning from Incidents and Establishing Useful Metrics

Workers should report all hand injuries and near misses to employers for treatment and investigation. Injury data is a lagging indicator which measures a company's health and safety performance by tracking accident statistics. Examples include:

- Injury frequency and severity
- Lost workdays
- Incidents and near misses
- Workers' compensation costs

These metrics evaluate the overall past effectiveness of your workplace health and safety program.



Leading Indicators

Leading indicators focus on future safety performance and continuous improvement. These measures are proactive and report what employees and management are doing regularly to prevent injuries.

Leading indicators that are connected to specific occupational health and safety program goals introduce a real level of accountability. It's important to establish metrics based on impact. For example, don't just track the number and attendance of safety meetings and training sessions–measure the impact of the safety meeting by determining the number of people who met the key learning objectives of the meeting / training.

Regarding leading indicators for hand safety, consider tracking when gloves were:

- Not worn when they should have been
- Worn near entanglement hazards or contrary to company rules and equipment specifications
- Worn past their service life or are damaged
- Not appropriate for the hazard
- Reviewed in Safety Meetings and Tool Box Talks
- Efficacy at preventing hand injuries and, if ineffective, then why?

It's easy to focus on negative results and non-compliance when reviewing performance. However, focusing on the negative may discourage workers who could become apathetic to safety initiatives and programs. Finding a way to interpret data in a positive light can be beneficial for moral. For example, 2.5% of workers not wearing gloves also means that 97.5% were wearing gloves.

Sources: CCOHS website and ReThinking Hand Safety

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10. STRETCHING AND MSI INJURY PREVENTION

A MSI (Musculoskeletal Injury) is an injury or disorder of the muscles, tendons, ligaments, joints, nerves, blood vessels or related soft tissue. They include sprains, strains, and inflammation that work related tasks may cause or aggravate.

Hands, fingers, and wrists are susceptible to MSIs. To prevent sprains and strains from becoming debilitating injuries, supervisors and workers must be familiar with the risk factors and symptoms, along with controls and mitigations, of potential MSI's.

Risk Factors

The risk factors that contribute to potential MSIs include:

- Force: lifting / lowering, carrying, pushing, pulling, pinching or power gripping. Examples: holding a hammer, lifting a heavy box
- Repetition: using the same muscles over and over without rest or recovery. Examples: loading shotcrete, replacing hydraulic hoses on bolters, electricians pulling cable
- Awkward posture: any position where a body segment is angled outside the mid-point range of motion for that joint. Example: installing overhead attachments (e.g. pipe supports) into the rock face
- Contact stress: pressure from a hard or sharp object can damage nerves and tissues beneath skin Examples: ridges / hard edges of hand tools pressing into hand, or sharp edges digging into wrists
- Vibration examples: vibrations from power tools (e.g. Hilti® drills, pneumatic jack leg drills)

Often a task will expose workers to several risk factors, creating a cumulative effect and potential for injury not only to their hands or wrists but also to their arms and backs.

Controls and Mitigations

To reduce the potential for injury:

- Identify and document risk factors in Job Hazard Assessments and Field Level Hazard Assessments
- Implement controls to reduce the potential for injury

Typical controls include using mechanical aids (screw gun instead of a screwdriver), reducing duration of work, having breaks, using ergonomically designed tools, and using specially designed gloves. Be aware that implementing controls to reduce one risk factor may expose workers to another.

Try doing stretches at the start of each shift. Follow a series of hand stretches to lessen the likelihood of developing hand injuries from work.

Warm Up (R, G, V): No holding positions.

Repetitive Strain Injuries = R
Excessive Gripping Injuries = G
Vibration Oriented Injuries = V

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Repetitive Strain Injuries = R | Excessive Gripping Injuries = G | Vibration Oriented Injuries = V

Symptoms

Workers should monitor their health for symptoms for MSIs and notify their supervisor if any develop. Slight MSI symptoms can develop into significant injuries suddenly and without warning.

Symptoms include numbness, tingling, pain, swelling, redness, and / or difficulty moving hands, fingers, or wrists. Untreated early symptoms can progress to:

- Tendinitis - swelling of a tendon
- Carpel tunnel syndrome - pressure on a nerve in the wrist, resulting in numbness, tingling, pain or weakness
- Hand arm vibration syndrome (HAVS) - reduced blood flow results in blanching of skin, numbness or tingling, and loss of sensation

Hand Exercises

The following exercises can help workers based on the hazard(s) they may encounter. They can do these hand exercises at breaks or between tasks for good hand health.

Range of Motion (R, G)

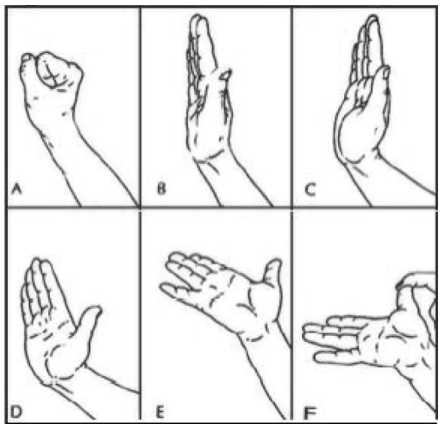
Hold positions for 10-15 seconds.

Self Mobilization / Massage (G, V)

Repeat each exercise for 10 seconds.

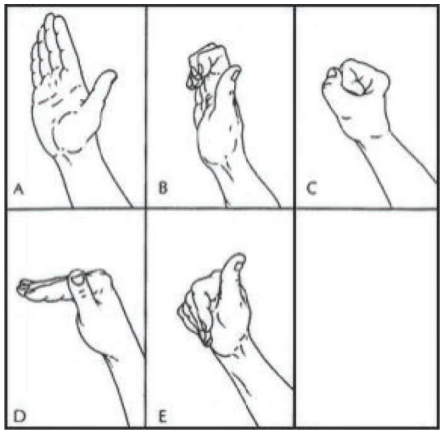
Nerve Gliding Exercises (R, G, V)

Hold each position for 7 seconds.



Tendon Gliding Exercises (R, G, V)

Hold each position for 7 seconds.



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11. TRADE SPECIFIC HAND RISK ASSESSMENTS

Roles:

- 11.1 Electric Arc & Blast Furnace Operation and Maintenance
- 11.2 Steel Rolling & Roll Mill Operation and Maintenance
- 11.3 Packaging, Shipping, and Scrapyard Work Managers and Hog Fuel Shippers

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11.1 ELECTRIC ARC & BLAST FURNACE OPERATION AND MAINTENANCE

Furnace operators and maintenance workers work with blast and electric arc furnaces in the steel refinery. They load the furnace with unrefined material, take samples of the molten mixture to ensure it meets requirements, and manage the extruded strands of molten steel to ensure it meets quality standards.

Maintenance roles work around and inside of non-operational furnaces to clean and maintain them. They remove insulative bricking from the inside of the furnace and install new bricking.

PPE Recommendations: Gloves

- Refractory – SCXLX, 399OBGKG5
- Strand Tender - 505ALB, 685BFI
- Ladle Metallurgy Facility (LMF) – 399OBGKG5, 378CXGOB
- Caster – 505ALB, 685BFI
- Ladle Tech and QC - 505ALB, 685BFI

OVERVIEW OF PRIMARY HAND TASKS, HAZARDS, AND RISK:

Primary Tasks	Primary Hand Hazard	Hand Requirements	Low	Moderate	High	Extreme
Taking samples of molten metal from furnace	Heat from molten metal	Grip				Heat
Welding	Sparks, slag, and heat from welding torch and surfaces	Dexterity Tactility Grip	Abrasion	Sparks Slag Heat		
Removal of old refractory, installing new refractory	Crush, pinch, and abrasion injuries from bricks Chemical exposure from sealers, mortar, and other chemicals used to secure bricks	Grip Dexterity	Crush Pinch	Abrasion	Chemical exposure	

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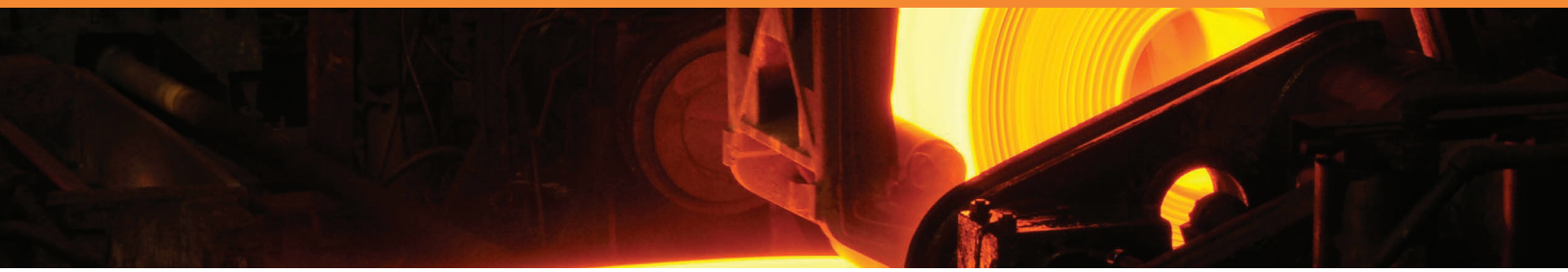

11.2 STEEL ROLLING & ROLL MILL OPERATION AND MAINTENANCE

Steel rolling and roll mill operators shape and forge steel strands. They ensure the steel billets / strands pass through the various rolls and stands. They measure width and gauge of the rolled material and adjust the rolls and stands as required.

Roll mill maintenance perform upkeep on the rolls and stands to ensure they are all aligned correctly. They adjust rollers, buffs, and guides according to the dimensions of the steel products they are producing.

PPE Recommendations: Gloves

- General Mill Operator – 399OBGKG5, 378CXGOB
- Downtime Maintenance – S21TXUFN
- Stand / Guide Builders and Maintenance - 399OBGKG5, S18TAGGFN
- Laser Cutter / Saw Maintenance – STACXPNRT, 399OBGKG5
- Mold Shop – STACXPNRT, S15GPNVB, 378CXGOB
- Etch Lab – S15KGV30N, 378GKGVB, S13KFGFNT
- Trim Operator - STACXPNRT
- Stacker, Banding, Tagger – STACXPNRT, 399OBGKG5, SKPX/PSS, S13CXSI

PPE Recommendations: Gloves

- General Mill Operator - KBKB1T12T
- Downtime Maintenance - KTAG18
- Stand / Guide Builders and Maintenance - KTAG18
- Laser Cutter / Saw Maintenance - KTAG18
- Mold Shop - KTAG18
- Trim Operator - KTAG18, KBKB1T12T
- Stacker, Banding, Tagger - KTAG18, KBKB1T12T

OVERVIEW OF PRIMARY HAND TASKS, HAZARDS, AND RISK:

Primary Tasks	Primary Hand Hazard	Hand Requirements	Low	Moderate	High	Extreme
Building and assembling stands, guides, and rollers	Pinch points between machines and components Knocks and bumps to back of hands Sharp edges on metal components Chemical and grease exposure to skin	Grip in wet / oily conditions Oil resistance Fine dexterity / sense of touch	Grease / chemical exposure	Impact Abrasion	Cut	

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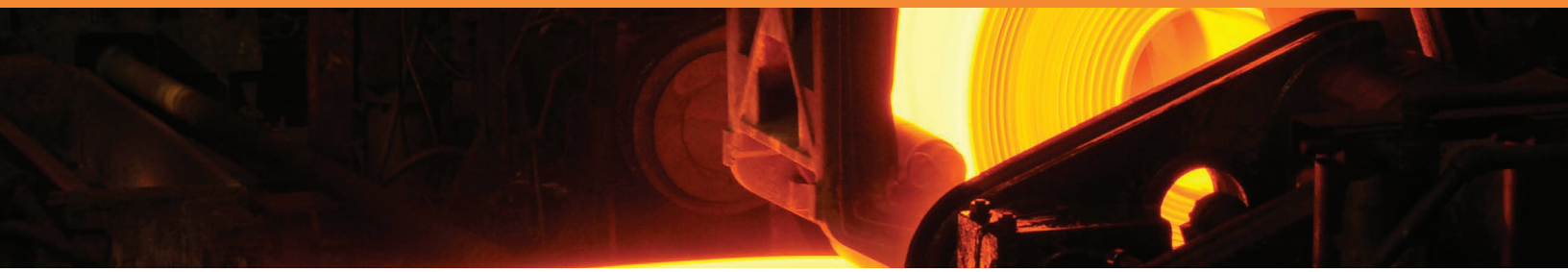

Primary Tasks	Primary Hand Hazard	Hand Requirements	Low	Moderate	High	Extreme
Maintaining saws and laser components	Pinch points between machines and components Knocks and bumps to back of hands Sharp edges on metal components Sharp blades Abrasion from filers and tool sharpeners	Grip in wet / oily conditions Oil resistance Fine dexterity / sense of touch	Grease / chemical exposure	Impact Abrasion	Cut	
Engineering molds, maintaining existing molds	Pinch points between machines and components Knocks and bumps to back of hands Sharp edges on metal components Sharp blades Abrasion from filers and tool sharpeners Chemical and grease exposure to skin	Oil resistance Grip in wet and oil conditions Fine dexterity / sense of touch	Grease / chemical exposure	Impact Abrasion	Cut	
Dipping steel components into corrosive chemicals	Corrosive chemical exposure to skin Sharp metal parts with rough unfinished edges	Oil and chemical resistance Grip in wet and oil conditions			Chemical exposure	
Trim finished goods to length using saws and lasers	Knocks and bumps to back of hands Sharp edges on metal components Sharp blades Heat	Oil resistance Grip in wet and oily conditions Fine dexterity / sense of touch	Oil resistance Abrasion			
Welding	Sparks, slag, and heat from welding torch and surfaces	Tactility Dexterity	Abrasion	Sparks Slag Heat		
Applying labels to steel billets	Heat from billets	Grip Dexterity		Sparks Slag	Heat	
Wrapping metal bands around groups of billets / steel	Heat from billets Sharp edges on metal banding	Grip Dexterity	Heat	Abrasion	Cut	

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11.3 PACKAGING, SHIPPING, AND SCRAPYARD WORK

Packaging and shipping finalize the goods produced, ensuring they are ready for their intended destination. They load and unload containers, vehicles, and rail cars either by hand or by operating assisted lifting devices and cranes.

In the scrapyard, workers sort through a wide variety of scrap metal to be reclaimed in the refinery process. They operate conveyors and cranes to sort and prepare scrap for reclamation.

PPE Recommendations: Gloves

- Shipping Crane Operator - STACXPNRT
- Shipping - STACXPNRT
- Switchman / Rail Car Operator - STACXPNRT, 378CXGOB, STXWPNVB
- Scrapyard Operator – 378CXGOB, STXWPNVB
- Scrapyard Maintenance – 378CXGOB, 378GCXVB

PPE Recommendations: Gloves

- Scrapyard Operator – KTAG18
- Scrapyard Maintenance – KTAG18

OVERVIEW OF PRIMARY HAND TASKS, HAZARDS, AND RISK:

Primary Tasks	Primary Hand Hazard	Hand Requirements	Low	Moderate	High	Extreme
Operating crane from control booth	Abrasion from crane ladder Incidental exposure to grease and sharp metal edges outside of crane operation	Grip Cut resistance	Cut			
Loading / unloading equipment and materials	Pinch points from materials / equipment being loaded / unloaded Knocks and bumps to back of hands Sharp metal edges Chemical and grease exposure to skin	Grip Dexterity Impact resistance Cut resistance Chemical resistance	Chemical	Grip Dexterity Impact	Cut	

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Primary Tasks	Primary Hand Hazard	Hand Requirements	Low	Moderate	High	Extreme
Sorting scrap material and components	Sharp edges on scrap material and components Pinch points between heavy metal pieces or components Knocks and bumps to back of hand Chemical and grease exposure to skin	Grip Dexterity Impact resistance Cut resistance Chemical resistance	Chemical	Grip Dexterity Impact	Cut	
Maintaining scrapyard equipment	Pinch points between machines and components Knocks and bumps to back of hands Sharp edges on metal components Chemical and grease exposure to skin	Grip in wet / oily conditions Oil resistance Fine dexterity / sense of touch	Grease / chemical exposure	Impact Abrasion	Cut	

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12. GLOVE & SLEEVE ROLE MATRIX

- Impact
- Leather
- Chemical
- Palm Coated
- Welding / Heat
- Sleeves

	SCXLX	S21TXUFN	S18TAGGFN	STACXPNRT	S13KFGFNT	SKPX/PSS	S13CXSI	S15GPNVB	STXWPNIVB	378GCXVB	378GKGVB	399OBGKG5	505ALB	685BFI	378CXGOB	S15KGV30N	KBKB1T	KTAG
																		
	S - XL	5 - 12	5 - 11	5 - 12	5 - 12	S/M, L/XL, 2XL/3XL	6 - 12	6 - 12	7 - 12	S - 3XL	XS - 3XL	XS - 2XL	M - 2XL	L	S - 3XL	7 - 11	XS - 2XL	XS - XL
ELECTRIC ARC & BLAST FURNACE OPERATION AND MAINTENANCE																		
Refractory	●											●						
Strand Tender													●	●				
Ladle Metallurgy Facility (LMF)												●			●			
Caster													●	●				
Ladle Tech and QC													●	●				
STEEL ROLLING & ROLL MILL OPERATION AND MAINTENANCE																		
General Mill Operator												●			●		●	
Downtime Maintenance		●																●
Stand / Guide Builders and Maintenance			●									●						●
Laser Cutter / Saw Maintenance				●								●						●
Mold Shop				●				●							●			●
Etch Lab					●						●					●		
Trim Operator				●													●	●
Stacker, Banding, and Tagger				●		●	●					●					●	●
PACKAGING, SHIPPING, AND SCRAPYARD WORK																		
Shipping Crane Operator				●														
Shipping				●														
Switchman / Rail Car Operator				●					●						●			
Scrapyard Operator									●						●			●
Scrapyard Maintenance										●					●			●

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13. GLOVE RECOMMENDATIONS

EMERALD CX® SCXLX | S - XL

Everyday 13-gauge gloves with latex palm coating for more flexible dry grip

ANSI A5 CUT | ANSI 3 PUNCTURE | ANSI 4 ABRASION

TENACTIV™ S21TXUFN | 5 - 12

World's thinnest silicone-free maximum cut protection with foam nitrile palm coating for better wet grip

ANSI A9 CUT | CUT 360° | ANSI 3 PUNCTURE | ANSI 3 ABRASION

TENACTIV™ S18TAGGFN | 5 - 11

Green hi-viz ultra-thin gloves with static-blocking properties plus foam nitrile palm coating for better wet grip

ANSI A4 CUT | ANSI 4 PUNCTURE | ANSI 4 ABRASION | MADE IN THE AMERICAS

TENACTIV™ STACXPNRT | 5 - 12

Non-marring micropore palm coating for better wet grip plus touchscreen compatibility

ANSI A7 CUT | ANSI 4 PUNCTURE | ANSI 5 ABRASION | NON-MARRING

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DEXTERITY® S13KFGFNT | 5 - 12

With foam nitrile palm coating for better wet grip plus reinforced thumb crotch for durability

ANSI A4 CUT | ANSI 3 PUNCTURE | ANSI 4 ABRASION

COOL GRIP® SKPX/PSS | S/M, L/XL, 2XL/3XL

Maximum heat resistance for protection up to 320°C / 608°F with striped silicone palm coating to increase grip, heat resistance, and flexibility

ANSI A4 CUT | ANSI 5 HEAT | EN407 444XXX | MADE IN THE AMERICAS

EMERALD CX® S13CXSI | 6 - 12

High cut resistant, non-marring gloves with adhesive-resistant and liquid-resistant silicone palm coating plus heat protection up to 200°C / 392°F

ANSI A6 CUT | ANSI 2 PUNCTURE | ANSI 6 ABRASION | ANSI 3 HEAT | NON-MARRING

DEXTERITY® S15GPNVB | 6 - 12

Comfortable high cut resistance and impact protection with micropore nitrile palm coating for better wet grip

ANSI A5 CUT | ANSI 3 PUNCTURE | ANSI / ISEA 138 2 | ANSI 3 ABRASION

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TENACTIV™ STXWPNVB | 7 - 12

Breathable waterproof and windproof gloves with high cut resistance, impact protection, and micropore nitrile palm coating for better wet grip

ANSI A6 CUT | CUT 360° | ANSI 4 PUNCTURE | ANSI / ISEA 138 2 | ANSI 5 ABRASION

ENDURA® 378GCXVB | S - 3XL

Maximum cut resistance with back-of-hand impact protection

ANSI A9 CUT | ANSI 5 PUNCTURE | ANSI / ISEA 138 2

ENDURA® 378GKGVB | XS - 3XL

Arc flash-rated multi-hazard gloves with impact resistance and high cut protection plus padded palms for vibration dampening and enhanced comfort

ANSI A5 CUT | ANSI 5 PUNCTURE | ANSI / ISEA 138 2 | ANSI 4 ABRASION | ARC FLASH 25 cal/cm² | FR

ENDURA® 399OBGKG5 | XS - 2XL

Premium leather cut-resistant gloves that repels oil and water with 6” cuffs for added wrist and forearm protection

ANSI A4 CUT

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ENDURA® 505ALB | M - 2XL

With aluminized back that reflects radiant heat and ultraviolet light to protect hands during long sessions of stick welding

ANSI A4 CUT | ANSI 5 PUNCTURE | ANSI 5 ABRASION | ANSI 3 HEAT

ENDURA® 685BFI | L

With lining that reflects radiant heat to protect hands during long sessions of stick welding

ANSI 4 ABRASION | ANSI 4 HEAT

ENDURA® 378CXGOB | S - 3XL

Maximum cut-resistant leather gloves that resist water and oil penetration

ANSI A9 CUT | ANSI 5 PUNCTURE

CHEMSTOP™ S15KGV30N | 7 - 11

Cut-resistant PVC gloves with nitrile palm and back-of-hand coating plus heat protection up to 140°C / 284°

ANSI A5 CUT | ANSI 2 PUNCTURE | ANSI 3 ABRASION | ANSI 2 HEAT

CONTENDER™ KBKB1T | XS - 2XL

Black cut-resistant sleeves with heat protection up to 140°C / 284°F and resistance to sparks and melting

ANSI A4 CUT · ANSI 2 HEAT · FR · EN407 X1XXXX · MADE IN THE AMERICAS

TENACTIV™ KTAG | XS - XL

All day comfort that is cool to the touch

ANSI A5 CUT · MADE IN THE AMERICAS

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14.1 FULL TIME GLOVE USE

Experience has shown that when workers wear gloves, they are better protected from other incidental hazards like slivers and abrasive or sharp surfaces.

Gloves should only be removed when they can cause entanglements or other hand injuries in accordance with hazard assessments, SWP, SJP, or manufacturer/supplier operating instructions.

14.2 COMFORT AND FUNCTIONALITY FACTORS

Comfort and functionality factors are important to workers and directly impact their use of gloves directly and should be part of the evaluation to determine gloves that are appropriate for workers. These factors include fit, grip, breathability, flexibility, tactile sense, dexterity, and touch screen compatibility. If a worker's gloves lack these factors, workers may be inclined to remove their gloves or not wear their gloves and expose their hands to hazards unnecessarily. Glove trials are a helpful step in finding the rights gloves especially with regards to comfort and functionality.

14.3 HAZARD PROTECTION STANDARDS

Worldwide, there are two cut standards: the American ANSI 105-2016 standard and the European EN388 standard. Many employers and workers may be unfamiliar with these standards.

The following guide to standards can help employers and workers identify glove performance as it relates to task hazards. The five main glove performance guidelines cover cut, impact, heat, abrasion, and puncture.

Cut Test
A glove's ability to protect against cuts and lacerations is tested using ASTM F2992-15 as required by the ANSI/ISEA 105-2016 standard.

Impact Test
A glove's ability to protect hands against impact injuries is tested using the ANSI/ISEA 138-2019 standard.

Heat Test
Rates the glove material between level 1 (under 176°F) and level 5 (608°F). While the test stops at 608°F, the glove may have higher thermal protection.

Abrasion Test
A glove's ability to protect hands against injury from abrasions is tested using ASTM D3389 as required by the ANSI/ISEA 105-2016 standard.

Puncture Test (Hypodermic needle)
A glove's ability to protect hands against fine puncture injuries (e.g. hypodermic needles) is tested using ASTM F2878 as required by the ANSI/ISEA 105-2016 standard.

Puncture Test (Probe)
A glove's ability to protect hands against large puncture injuries (e.g. screws and nails) is tested in accordance with clause 6.4 of EN 388:2003 as required by the ANSI/ISEA 105-2016 standard.

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14.4 GUIDE TO ANSI & ASTM RATINGS

Cut Resistance | Which Cut Level do I Choose?

ANSI A1 CUT	ANSI A2 CUT / ANSI A3 CUT	ANSI A4 CUT	ANSI A5 CUT / ANSI A6 CUT	ANSI A7 CUT / ANSI A8 CUT / ANSI A9 CUT
NUISANCE Cut Hazards	**LOW Cut Hazards**	**MODERATE Cut Hazards**	**HIGH Cut Hazards**	**EXTREME Cut Hazards**
200 – 499 grams to cut	500 – 1,499 grams to cut	1,500 – 2,199 grams to cut	2,200 – 3,999 grams to cut	4,000 – 6,000+ grams to cut
Paper Cuts, Material Handling, Parts Assembly	Material Handling, Small Parts Handling, General Purpose, Warehouse, Construction	Bottle & Glass Handling, Drywalling, Electrical, HVAC, Automotive Assembly, Metal Handling	Sharp Metal Stamping, Metal Recycling, Pulp & Paper, Automotive, Aerospace Industry, Meat Processing	Sharp Metal Stamping, Butchering, Pulp & Paper, Oil & Gas, Industrial Pipe Fitting, Sheet Metal, Steel Cable Handling, Food Processing

Abrasion Resistance | Which Abrasion Level do I Choose?

COATED GLOVES
Coated gloves provide better grip in wet and dry conditions and let your hand move more freely than a leather glove. But if you're dealing with high abrasion like pulling ropes, palm coatings may wear down too quickly.

LEATHER GLOVES
Leather gets a bit of bad wrap. But when it comes to abrasion resistance, leather is amazing. It will protect your hands, take a beating, and will have a longer lifespan than a coated glove.

HYBRID GLOVES
The best thing about glove innovation is that you get the best of both worlds. Like our Clutch Gear® Goatskin Mechanics Glove. It features nylon backing for freedom of movement and a double leather palm for amazing abrasion resistance.

Tested at 500g of Force			Tested at 1,000g of Force		
ANSI 1 ABRASION	ANSI 2 ABRASION	ANSI 3 ABRASION	ANSI 4 ABRASION	ANSI 5 ABRASION	ANSI 6 ABRASION
> 100 Abrasion Revolutions	> 500 Abrasion Revolutions	> 1,000 Abrasion Revolutions	> 3,000 Abrasion Revolutions	> 10,000 Abrasion Revolutions	> 20,000 Abrasion Revolutions

Puncture Resistance | Which Puncture Level do I Choose?

Most puncture gloves only protect the palm area of the hand, which is okay for many applications — just be aware of this. Full-coverage puncture gloves are available, but they tend to be more expensive and offer less comfort and dexterity.

ASTM F2878: Fine object puncture threat

ANSI 1 PUNCTURE	ANSI 2 PUNCTURE	ANSI 3 PUNCTURE	ANSI 4 PUNCTURE	ANSI 5 PUNCTURE
≥ 2 Newtons of Puncture	≥ 4 Newtons of Puncture	≥ 6 Newtons of Puncture	≥ 8 Newtons of Puncture	≥ 10 Newtons of Puncture
Waste Handling, Law Enforcement, Pulp & Paper, Recycling (risk of needles)				

EN 388:1994: Large object puncture threat

ANSI 1 PUNCTURE	ANSI 2 PUNCTURE	ANSI 3 PUNCTURE	ANSI 4 PUNCTURE	ANSI 5 PUNCTURE
≥ 10 Newtons of Puncture	≥ 20 Newtons of Puncture	≥ 60 Newtons of Puncture	≥ 100 Newtons of Puncture	≥ 150 Newtons of Puncture
Glass, Recycling (without risk of needles), Lumber				

Heat Resistance | Which Heat Level do I Choose?

HEAT TESTING

Heat testing measures the conductive heat resistance of a material to determine its thermal insulation properties for contact with hot surfaces.

TIME TO PAIN

The glove's rating is determined by the highest contact temperature where time to second degree burn is over 15 seconds and time to pain is over 4 seconds.

STANDARD TEMPERATURE

The standard rates the material between level 1 (under 176°F) and level 5 (608°F).
Note: While the test stops at 608°F, the glove may have higher thermal protection

Highest contact temperature (°F) at which both time to 2nd degree burn > 15 seonds and alarm time > 4 seconds

ANSI 0 HEAT	ANSI 1 HEAT	ANSI 2 HEAT	ANSI 3 HEAT	ANSI 4 HEAT	ANSI 5 HEAT
< 176°F Heat Temperature	176°F Heat Temperature	284°F Heat Temperature	392°F Heat Temperature	500°F Heat Temperature	608°F + Heat Temperature

Impact Resistance | Which Impact Level do I Choose?

ANSI / ISEA 138 is the first impact standard for the North American market and goes above and beyond the requirements in the European standard, EN 388. Under the new standard, both the knuckles and fingers are tested and the lowest impact protection level achieved is the one assigned to the glove. It is the only standard that requires testing be conducted by a third-party in an accredited lab, a first for PPE protection standards.

ANSI / ISEA 138 1	ANSI / ISEA 138 2	ANSI / ISEA 138 3
Mean < 9 All Impacts ≤ 11.3 kN	Mean < 6.5 All Impacts ≤ 8.1 kN	Mean < 4 All Impacts ≤ 5 Kn

These recommendations are of a general nature and are not specific to everyone's needs. Always ensure your selected glove complies with the mandated safety standard recommended for your application.

The information contained in this report is for discussion purposes and general information only. Superior Glove assumes no responsibility for action taken (or not taken) by the recipient.

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14.5 WORKING WITH HAZARDOUS SUBSTANCES

If a task includes handling hazardous products or substances, employers and workers must verify that the gloves they intend to wear are appropriate. Because of the potential for material to spill or splash, additional arm or wrist protection may be required.

Refer to the product's safety data sheets (SDS) and exposure control plans (ECP) to understand the hazardous properties and hand PPE requirements.

Chemicals will degrade the material components of gloves, so it is important for workers to inspect their condition for any potential compromises to glove integrity.

Choosing the correct chemical-resistant glove can be a complex process. We intend the following chart as a guideline for the initial evaluation of chemical appropriate gloves. Employers should discuss their glove choices with the manufacturer about getting the right glove.

Ensure workers have the correct size and are correctly donning and removing gloves (without touching a glove's outer surface to avoid contamination). After handling chemicals, they should follow the exposure control plan (ECP) for disposal, decontamination, or cleaning. A best practice is to always wash hands thoroughly before the next task and especially before eating.

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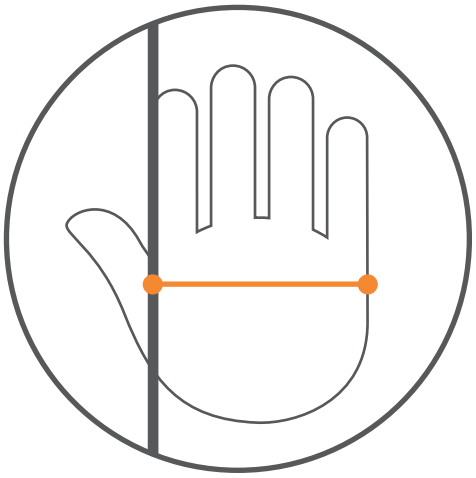
14.6 SIZING GUIDE

GLOVE SIZING GUIDE

A proper fit is extremely important. An uncomfortable fit causes hand fatigue and ultimately could lead to a potential workplace hazard.

Measure the width of your hand from the base of your first finger and across your knuckles.

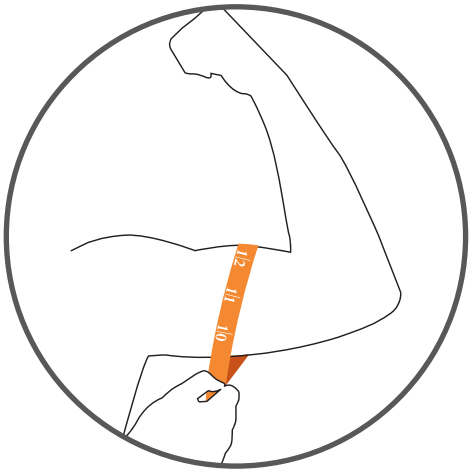


5 / 2XS	50 mm / 2 inches	9 / L	101 mm / 4 inches
6 / XS	63 mm / 2.5 inches	10 / XL	113 mm / 4.5 inches
7 / S	75 mm / 3 inches	11 / 2XL	126 mm / 5 inches
8 / M	88 mm / 3.5 inches	12 / 3XL	140 mm / 5.5 inches

SLEEVE SIZING GUIDE

To find the best fit, measure the circumference of your bicep and choose sizing according to the chart below.

Sleeves come in multiple lengths.



2XS	250 mm / 9.75 inches	L	295 mm / 11.75 inches
XS	260 mm / 10.25 inches	XL	370 mm / 14.5 inches
S	265 mm / 10.5 inches	2XL	450 mm / 17.5 inches
M	280 mm / 11 inches		

For a more natural fit, sleeves come in a tapered version which provide better comfort and staying power. Tapered sleeves are designed to fit the contours of your arm and won't lose shape due to stretching

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14.7 GLOVE GAUGE GUIDE

A glove's gauge designates the number of stitches per inch in a knitted glove. The higher the number of stitches per inch, the thinner, more dexterous, and flexible the glove becomes.

Our 7-gauge gloves are the coarsest and employ the largest needles to stitch gloves together. In contrast, smaller needles are needed to make our 21-gauge gloves since the yarn used to make them is much thinner. The density/tightness of the knit also increases as they go up in glove gauge.

In general, it used to be that lower gauges were recommended for more safety against hazards since the thicker the glove, the more protection they would provide. Thanks to engineered yarn technology, glove manufacturers are now able to offer protection against multiple types of hazards while still keeping the glove thin and dexterous. Using engineered yarn to make our gloves allows us to offer the same valuable cut protection and durability that used to only be available in lower gauges in thinner, more comfortable dexterous shells.

7 GAUGE GLOVE

7 stitches per inch

21 GAUGE GLOVE

21 stitches per inch

14.8 REPLACING GLOVES

A work glove's longevity depends on the work, the type of glove being used, the materials it's constructed from, and the duration of the task or application.

Wear and tear are the clearest signs for replacement as any area of damage reduces the level of protection. If a knitted glove with a cut rating snags and pulls, for example, it will alter the construction of the glove. The glove may still offer cut protection but not at the original level which increases the chance of injury.

Examples of gloves being worn on work sites that should be replaced and never worn to this level of wear.

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14.9 GLOVE LAUNDERING

Our gloves are designed and built to out-perform and out-last the competition–but you can get even more out of your investment with proper care.

Guidelines

For a professional clean, our customer service representatives can recommend the best launderers in your area. **If you would rather wash your gloves yourself, keep in mind that different materials require different treatments.** The following are general guidelines for laundering different materials that you can use to extend the useful life of your gloves.

TENACTIV™ OR DYNEEMA®

TenActiv™ and Dyneema® can be washed, dry cleaned, or bleached, all without affecting the materials' specific properties. You may wash and re-use the gloves multiple times as standard detergents, ammonium, sodium hydroxides, and hydrochloric acids are not known to affect the performance of the fiber.

Washing:

1. Wash in cold water of 104°F/40°C or less only
2. Tumble dry with low or no heat

One limitation of fibers such as these is hot temperatures–the fibers will not withstand temperatures (wet or dry) over 291°F/144°C

PARA-ARAMID

The cut-resistant qualities of aramid materials are inherent and remain unchanged over the life of the glove. Para-aramids can be washed over and over with no effect on shrinkage, weight loss, or changes in tensile strength.

Detergent Wash:

1. Use approximately five pounds of commercial laundry soap or detergent per 100 pounds of para-aramid
2. Wash in hot water (170°F/75°C)
3. Wash for 20 minutes
4. Rinse with hot water
5. If necessary, repeat steps 3 and 4
6. Rinse in cold water
7. Tumble dry for 35 minutes at 155°F/70°C

Dry Clean:

1. Pre-wash using perchloroethylene for 5 minutes
2. Drain
3. Wash for 20 minutes using perchloroethylene and twelve ounces of anionic surfactant per 100 pounds of Kevlar®
4. Tumble dry at 140°F/60°C or less

While resistant to many chemicals and solvents, para-aramids must never be bleached (oxygen 'bleach' can be used in place of chlorine bleach)

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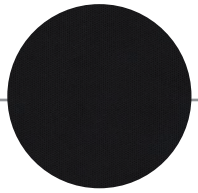
LAUNDERING OTHER MATERIALS

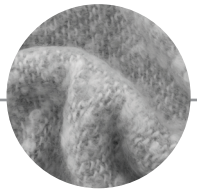
COTTON/POLYESTER

1. Wash with warm water (105°F/40°C) and regular detergent
2. Tumble dry at medium heat



NYLON

1. Wash with warm water (105°F/40°C) and regular detergent
2. Tumble dry at low or no heat

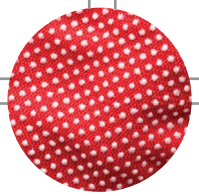


WOOL

1. Only use cold water (70°F/20°C or less)
2. Gently wash with a mild detergent
3. Tumble dry at low or no heat

LEATHER

1. Always dry clean leather
2. Think of leather as much like your own skin (it is in effect an animal's skin); soap and water will remove leather's natural oils and cause the gloves to become stiff and brittle



COATED

1. Wash in cold water (85°F/30°C or less)
2. Use a mild detergent
3. Tumble dry at low or no heat
4. Bleach is not recommended

Tips:

- When washing palm coated gloves, you can turn them inside out to tumble dry or air dry
- If you are washing your gloves with your other work clothes, be sure to not cross contaminate and clean appropriately to all laundering requirements

Cost Savings

If you're using gloves made from high-quality leather, TenActiv™, Dyneema®, or para-aramids, laundering your gloves can significantly increase their lifecycle and result in substantial cost savings without impeding performance.

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