



ISEA Whitepaper

Selecting the Best Impact-Resistant Hand Protection



Special Reports for the Safety Equipment Industry.

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Selecting the Best Impact-Resistant Hand Protection



Hand-impact injuries are common, expensive and preventable. The International Safety Equipment Association (ISEA) served as the convening body for companies manufacturing, distributing and using hand-impact protection to create the American National Standard for Performance and Classification for Impact Resistant Gloves (ANSI/ISEA 138-2019), which was released in February 2019. This white paper outlines the problem, explores contributing factors, and explains prevention and protection options.

Hand Impact: A Big Problem

The hand is the second most common body part injured in the workplace, reported [Industrial Safety & Hygiene News](#). More than 42% of nonfatal occupational injuries to upper extremities in 2017 involving days away from work in private industry involved hands. Of the 286,150 nonfatal occupational injuries to upper extremities in 2017 involving days away from work in private industry, 121,860 involved hands, the [U.S. Bureau of Labor Statistics reported](#).

Offshore oil and gas, construction, mining, manufacturing, warehousing and transport industries are particularly susceptible to hand-impact injuries. The International Association of Drilling Contractors (IADC) [2018 Summary of Occupational Incidents](#) (published in June 2019) revealed that 29.47% of total industry lost-time incidents by body part involved fingers (20.26%) and hands/wrists (9.21%), and that 41.41% of total industry recordable incidents by body part involved fingers (31.12%) and hands/wrists (10.29%).

Costly Injuries

Hand injuries are expensive, costing from \$540 to \$26,000, according to the National Safety Council — with certain types of damage costing far more. And because injuries to the hand are the second-most common type of workplace injury, they have a significant impact on workers compensation claims. The National Council on Compensation Insurance, Inc., [found that](#) “the preliminary 2018 average indemnity accident year claim severity increased by 3% relative to the corresponding 2017 value. Medical lost-time claim severity increased by 1%.”

Hand-impact injuries can be especially difficult to treat and recover from, particularly if any of a hand’s 27 bones are crushed instead of cleanly broken. The biggest injury risks have been dorsal or back-of-hand injuries such as bone breakage and fractures, as well as bruising and finger pinching. In addition to bone injuries, hand-impact accidents can also damage muscles, tendons and ligaments.

Preventable

According to the Occupational Safety & Health Administration (OSHA), 70.9 percent of hand and arm injuries could have been prevented with personal protective equipment (PPE), specifically safety gloves. Yet, 70% of workers don’t wear hand protection. And of those who do, 30% don’t wear the right kind of glove for the task. Thus, prevention requires the right PPE, as well as proper training on safety practices and PPE use.

Since healthy hand function is so essential to many tasks, the stakes are high for both employees and employers. Up until 2019, though, there was no standardized approach for protecting against those injuries, although standards and guidance were in place for certain types of hand injuries such as those caused by cuts, punctures and chemical exposure.

The Occupational Health & Safety Administration (OSHA) are encouraged to reference the American National Standard for Performance and Classification for Impact Resistant Gloves (ANSI/ISEA 138-2019) in federal workplace safety regulations.



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Business Case (ROI) for Hand-Impact Protection

As the National Safety Council (NSC) explains in its publication, [The Business Case for Investment in Safety – A Guide for Executives](#): “A single incident involving one employee such as an accident, a serious illness, or family crisis can affect everyone around them, not to mention the effects the business interruption has on production or service.”

The NSC [reports](#): “Work-related medically consulted injuries totaled 4.5 million in 2017, and total work injury costs were estimated at \$161.5 billion. Costs include wage and productivity losses, medical expenses, administrative expenses, motor vehicle property damage, and employer costs.” (NSC offers these helpful [infographics on work-injury costs](#).)

The American Society of Safety Professionals (ASSP) [outlines five key reasons](#) why “sound safety practices are both socially responsible and good business. Research and industry experience suggest organizations that invest in occupational safety and health experience a return on investment (ROI). Returns stem from:

- **Positive public image:** Employers want their employees, customers and the public to view them as safety minded, health conscious and sustainable.
- **Compliance with regulations, laws and standards:** Non-compliance can be disastrous and cost an organization financially and in public perception.
- **Cost savings:** Occupational safety and health (OSH) programs can reduce costly worker injuries and incidents — allowing companies to reduce expenses related to medical care, paid time off, litigation and disaster mitigation.
- **Increased operational efficiency:** An organization-wide focus on safety leads to higher worker productivity, which drives short-term revenue growth and supports long-term

sustainability.

- **Improved employee satisfaction:** Recruiting and retaining top talent is easier for organizations that provide safe and comfortable workplaces, care for employee well-being and protect the environment.”



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Workers’ compensation costs must also be considered when calculating the ROI of preventing these injuries. An often-cited study by the Stanford University Department of Civil Engineering showed that indirect costs often exceed the direct costs. For example, a 2013 article by Cavnac & Associates insurance brokers [explains](#) that “a fracture on average generates direct costs of \$50,000. The indirect costs, however, are estimated at \$55,000.” (Those costs would presumably be higher today.)

To help employers understand how occupational injuries and illnesses can impact a company’s profitability, OSHA offers an online tool called [“Safety Pays.”](#) which “uses a company’s profit margin, the average costs of an injury or illness, and an indirect cost multiplier to project the amount of sales a company would need to cover those costs.” According to OSHA, “Safety Pays” estimates include the following kinds of indirect costs:

- Any wages paid to injured workers

for absences not covered by workers' compensation

- The wage costs related to time lost through work stoppage associated with the worker injury
- The overtime costs necessitated by the injury
- Administrative time spent by supervisors, safety personnel, and clerical workers after an injury
- Training costs for a replacement worker
- Lost productivity related to work rescheduling, new employee learning curves, and accommodation of injured employees
- Clean-up, repair, and replacement costs of damaged material, machinery, and property

An analysis of Bureau of Labor Statistics (BLS) [data](#) by Pennsylvania-based [MedExpress](#) found that “Sixteen percent of all workplace hand injuries involve employees who are 55 and older and often require longer periods of recovery, which means more days away from work following an injury. While the median number of work days missed overall for hand injuries is five, older workers who experience these injuries often need 12 to 14 days to recover.”

“**ANSI/ISEA 138 provides much-needed guidance to employers in the proper selection and use of gloves to reduce hand injuries.**”

Jill Clements

Chair of the ISEA Hand Protection Group

Further, MedExpress reported that “hand injuries don’t just cost employers and employees missed days. It’s very easy for these injuries to quickly grow more and more expensive financially, depending on the type of injury. According to the Bureau of Labor Statistics (BLS), the average hand injury claim has cost more than \$6,000 in recent years. Lost-time workers’ compensation claims for hand injuries have exceeded that, costing an average of \$7,500.”

In addition, while hand injuries are not typically fatal, they can nonetheless negatively affect

employee morale. While that might sound like a warm-and-fuzzy issue to some employers, it can affect the bottom line through lost productivity, potentially dangerous distractions, and turnover-related costs.

About ANSI/ISEA 138

The International Safety Equipment Association (ISEA) released ANSI/ISEA 138-2019, *American National Standard for Performance and Classification for Impact Resistant Hand Protection* in February 2019 to improve on the impact performance of industrial gloves. The new standard builds upon the widely used ANSI/ISEA 105-2016, *American National Standard for Hand Protection Classification*.

The U.S. and Europe have long had standards for industrial gloves that protect hands from cuts, punctures, abrasion and chemical exposure, but ANSI/ISEA 138 is the first standard to address the risk from impact injuries in North America.

“ANSI/ISEA 138 provides much-needed guidance to employers in the proper selection and use of gloves to reduce hand injuries,” said Jill Clements, chair of the ISEA Hand Protection Group. “While ISEA members have been leaders in developing products to reduce hand injuries, and continue to create products to protect workers’ hands from impacts, cuts and abrasions, we needed a standardized method for the industry to evaluate a baseline level of protection for back-of-the-hand exposures.”

“ISEA members recognize that the decision-making process can be challenging, given the numerous glove designs currently available,” said Rodney Taylor, MS, MBA, Global Sales and Marketing Manager, Industrial PPE for D3O and chair of ISEA’s impact-glove working group. “We believe the standard will enable safety professionals to make better-informed decisions about glove selection, ultimately reducing the number of injuries to a worker’s important asset—the hand.”

“The ISEA Hand Protection Group worked many hours to make this new standard a cutting-edge response to the need for products that would be

of-the-hand impact injuries,” said Cristine Fargo, ISEA Vice President of Operations and Technical Services.

Why the Standard Was Needed

ISEA-member company D3O set the scene well in its own white paper on ANSI/ISEA 138:

“For many years, there have been US and European standards for industrial gloves that protect from injuries such as cuts, punctures, abrasion and chemical exposure, but until recently there was nothing to help assess the performance of personal protective equipment (PPE) designed to reduce the risk of back-of-hand (dorsal) impact injuries. The situation only changed in 2016 when the wider European hand protection standard EN 388 was updated to include impact for the first time.

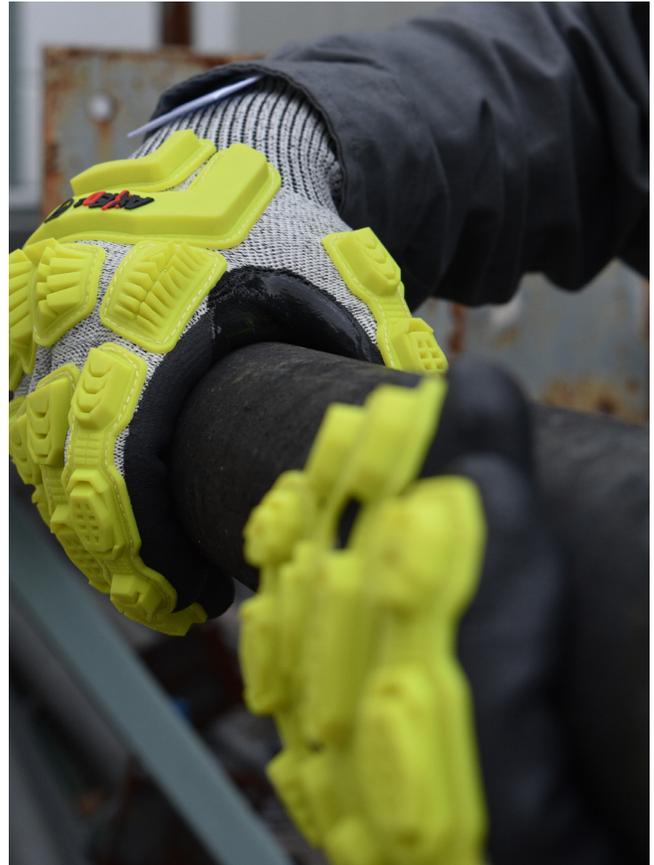
“This was an important move, welcomed by many manufacturers and end-users in Europe and elsewhere. But the US market remained without any performance-based standard to assess glove impact protection.”

“One of the reasons why setting a standard for impact may have lagged behind protection against cuts, abrasion, puncture and tears is that the market for dorsal impact protection is relatively young, compared with more traditional protective glove markets. ‘Cut resistant materials have been on the market for over 30 years,’” explains Paul Harris, VP of Product Strategy and Innovations at PPE manufacturer MCR Safety.

“Because of the newness of the technology, design and market, it has taken a while to generate the need for an impact standard. Now that the market has grown to a value of more than \$100 million globally, a standard is long overdue.

“We now have some of our larger end-users asking why we don’t have a standard, especially those in areas that have been

flooded with product choices and availability over the last eight years,’ says Harris. ‘From the other side, manufacturers that are doing things right for the worker want a performance-based standard because it will eliminate some of the unscrupulous and underperforming products that could put the worker at risk.’”



Radians

“There are so many vendors offering different gloves,’ says Ron Hope, Value Safety Manager for Luck Companies, which includes Luck Stone. ‘And the cost is not standard either; it varies a lot depending on what you are looking for. A standard, as a recommendation at least, with defined performance levels, will help when trying to decide which glove is appropriate for each task.’ He also points out that a standard should finally allow end-users to start being able to compare like with like. ‘For the glove manufacturers it will help standardize what they are offering,’ he adds. It won’t eliminate different styles, comfort levels or features, but it will consolidate what a protection level one glove means, and so on.”

As D3O's Rodney Taylor, wrote in [Occupational Health & Safety](#) (Jan/Feb 2019): "Without a reliable guide, buyers and safety departments may under- or over-specify gloves, incurring unnecessary expense or leaving workers open to injury."

Taylor's article included an insightful quote from Dan Markiewicz, an independent environmental health and safety consultant: "What's the most appropriate glove for back-of-hand impact protection? Until now, I have not been able to definitively answer the question. It normally boils down to trial and error: Obtain a variety of gloves that are advertised as offering impact protection, have employees try them out, get feedback, and go with the gloves most preferred by the end users. And what often happens after this? It's called trial and error for a reason. Eventually, an employee will inadvertently drop a tool on their hand and sustain an impact injury. That is not prevention, and it is a poor way to allocate resources."

How We Developed the Standard

ISEA conducts its standardization activities as an accredited member of the American National Standards Institute ([ANSI](#)). ISEA members, management and staff are experienced in the process of standardization, including development of standards, management of the consensus process, publication and distribution,

interpreting standards for users, and advocating their use.

ISEA's product groups draft standards that achieve consensus either through a formal review by a panel of all interested parties or by submission to an accredited standards committee. With either method, the standards undergo rigorous public review before they are approved as American National Standards. ISEA explains the standards-development process in detail on its [website](#).

What the Standard Does

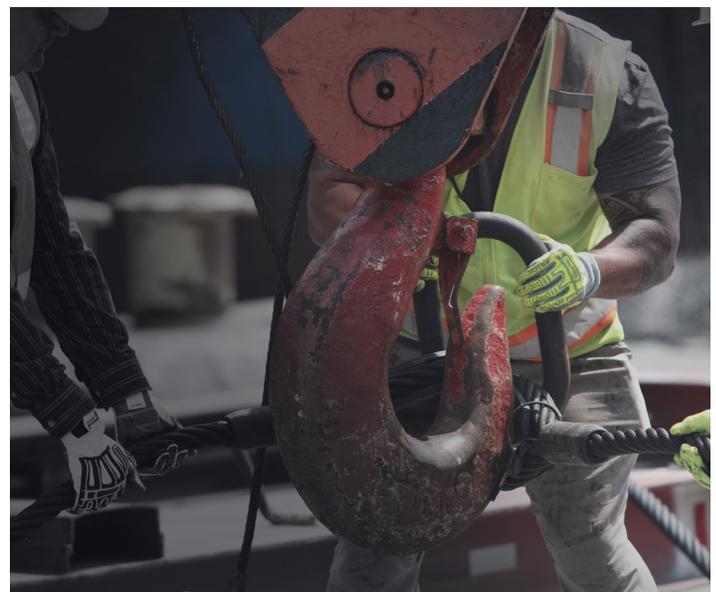
ANSI/ISEA 138-2019 was intentionally kept as simple as possible. "We kept a common goal of having an applicable standard that is understandable and can be replicated in labs worldwide," explained MCR Safety VP of Product Strategy and Innovations Paul Harris, in D3O's white paper.

ANSI/ISEA 138:

- Defines an agreed test method
- Includes three defined performance levels
- Specifies a pictogram mark for each of the levels for compliant gloves
- Requires products be tested in a laboratory with a certificate of accreditation meeting the requirements of ISO/IEC 17025:2017, *General requirements for the competence of testing and calibration laboratories*



D3O



HexArmor

How to Get Copies of ANSI/ISEA 138

Copies of [ANSI/ISEA 105-2016](#) and [ANSI/ISEA 138-2019](#) can be purchased online from ISEA and from ANSI's licensed resellers.

Implementing ANSI/ISEA 138

As noted earlier in this white paper, the Occupational Health & Safety Administration (OSHA) should reference ANSI/ISEA 138-2019 in federal workplace safety regulations. As OSHA itself explains on its [website](#), "Under the Occupational Safety and Health Act of 1970, employers are responsible for providing safe and healthful workplaces for their employees."

As an American National Standards Institute (ANSI) accredited standards-developing organization, ISEA standards that are incorporated by reference in OSHA regulations include:

- ANSI/ISEA Z87.1-2015 Occupational and Educational Eye and Face Protection
- ANSI/ISEA Z89.1-2014, Industrial Head Protection
- ANSI/ISEA Z308.1-2015, Industrial First Aid Kits and Supplies
- ANSI/ISEA 107-2015, High Visibility Safety Apparel and Headwear (by reference to the Manual on Uniform Traffic Control Devices for Streets and Highways or MUTCD)

In addition, ISEA has urged OSHA to update references pertaining to safety equipment standards, including newly developed standards.

#SafeHands Awareness Campaign

In response to the problem of workplace hand impacts and other types of hand injuries, ISEA launched an awareness and education campaign in 2019. The campaign was in partnership with the [National Waste & Recycling Association](#) and the [Voluntary Protection Programs Participants' Association](#).

"The campaign's goal is to help workers and their employers grasp the importance of proper hand protection," stated Lydia Baugh, ISEA's Director of External Affairs. ISEA created the hashtag #SafeHands for social media posting, and developed a special webpage — [SafeHandsAtWork.org](#) — with educational messaging, including an informative hand safety infographic (below), available via the webpage as a [downloadable PDF](#).



End-User Guide

What to look for in hand-impact protection

ANSI/ISEA 138-2019 specifies three performance levels, indicated with a numerical representation for the impact protection the glove offers. The higher the performance level number, the greater the degree of hand protection.

Note that a glove's performance level defaults to the lowest performance level recorded in a test for any part of the glove. As D3O explains in its white paper, for example, "if the fingers and thumb meet level one but the knuckles level two, the glove will still be rated as performance level one."

This [excerpt](#) from ISEA Hand Protection Group member HexArmor describes how the ANSI/ISEA 138 impact test is designed to work:

ISEA members have a seat at the table when standards are being written that affect their products; they get a first look at changes in standards, they influence the development of new standards, and they are kept informed of developments on standards around the world. ISEA developed the first American National Standard for glove selection criteria, ANSI/ISEA 105, and the Hand Protection Group is represented on other standards technical committees in the US and worldwide. ISEA works with NIOSH on research

Performance Level	Mean Transmitted Force	Increasing Protection 
ANSI/ISEA 138 	$\leq 4\text{kN}$	
ANSI/ISEA 138 	$\leq 6.5\text{kN}$	
ANSI/ISEA 138 	$\leq 9\text{kN}$	

[HexArmor](#)

“The ISEA 138 will test two areas for impact performance: knuckles, and fingers/thumb. On both gloves, knuckles are tested four times and fingers/ thumb are tested five times. The average of the knuckle tests is compared to the average of the ten finger tests. The highest average of the two (the highest amount of force transferred which delivers a lower score) is the final impact testing score. The chart with glove markings showcases the performance levels, with “Performance Level 3” being the highest.”

to improve glove sizing and fit for specific worker populations.

About ISEA’s Hand Protection Group

Current members of ISEA’s Hand Protection Group are [listed on ISEA’s website](#). Members of the group design, manufacture and market a full range of gloves to protect workers against cuts and lacerations, chemical and biological agents, electric shock, flame and temperature extremes, vibration and other hazards. They are manufactured and tested to rigorous material and product standards, and their use is mandated by OSHA and other regulatory bodies.



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For Impact Gloves and other hand protection resources:

Ansell Healthcare - www.ansell.com/us/en

Bob Dale Gloves - www.bobdalegloves.com

Conney Safety Products - www.conney.com

D3O - www.d3o.com

DSM Dyneema - https://www.dsm.com/products/dyneema/en_US/applications/cut-resistant-gloves.html

DuPont Personal Protection - www.dupont.com

Ergodyne - www.ergodyne.com

Global Glove & Safety Manufacturing - www.globalglove.com

HexArmor - www.hexarmor.com

Honeywell Safety Products - www.honeywellsafety.com/CA/Home.aspx

Kimberly-Clark Professional - www.kcprofessional.com/home

Lakeland Industries, Inc. - www.lakeland.com/home.html

Majestic Glove - www.majesticglove.com

Magid Glove and Safety Mfg. Co. LLC - www.magidglove.com

MCR Safety - www.mcrcsafety.com

National Safety Apparel - www.thinknsa.com

OccuNomix International LLC - www.occunomix.com

Protective Industrial Products Inc. - us.pipglobal.com/en

Pyramex - www.pyramexsafety.com

Radians - www.radians.com/radsite

Saf-T-Gard - www.saftgard.com

Wells Lamont Industrial - wellslamontindustrial.com

World Fibers - www.worldfibers.net