

Understanding the ISEA 138 Impact Protection Standard

Impact Standard Whitepaper

HexArmor[®]

A Game Changer for Hand Protection

Back-of-hand bones and soft tissues are extremely vulnerable to impact-related hand injuries among a wide range of jobsites. In fact, injuries to fingers and hands accounted for more than 23% of all injuries reported in a recent U.S. Department of Labor study. Matching the proper glove to the work task is imperative in mitigating impact-related issues and injuries – and having a proper standard in place is paramount to help with this process.

In an industry first, the International Safety Equipment Association (ISEA) has developed a new voluntary standard to address confusion in impact-related glove needs: ANSI/ISEA 138, American national standard for performance and classification for impact resistant hand protection. This U.S.-based impact performance standard will help safety professionals make better-informed decisions about glove selection – ultimately keeping more people safe on the job.

A Standard We Need

Until recently, the ANSI/ISEA 105:2016 hand protection standard covered cut, abrasion, tear, and puncture performance ratings, but there was no U.S.-based standard to help measure impact performance. Glove manufacturers could make almost any claim they wanted when it came to the protective nature of their impact technology, which created confusion as to what was protective enough for certain applications.

Industries like offshore oil and gas, mining, and construction, as well as manufacturing, warehouse, and transport workers will either require or recommend impact protection in worker gloves, but without a reliable guide, those in charge of acquiring safety gloves for their workers may under or over specify gloves, thereby incurring unnecessary expense or leaving workers open to injury. With this noticeable gap in protection and policy, a new standard was created to help.

Published February 27, 2019, the ISEA 138 standard establishes the minimum performance, classification, and labeling requirements for gloves that are designed to protect the knuckles and fingers (the most vulnerable areas in the hand) from impacts, updating the old standard which only covered the knuckles. The hope is that this standard brings a breath of fresh air to those that rely on impact protection gloves in their industry, as ultimately ISEA 138 implements a simpler way of testing and labelling gloves for an easy-to-understand performance standard.

Better-Suited Impact Resistance Testing

The ISEA 138 standard is better-suited for detailed analysis of impact resistance to the hand by ranking gloves based on three performance levels. Once tested and rated, the corresponding performance level is required to be displayed directly onto each industrial glove to give safety professionals a simple, visual indication of the performance standard, thereby increasing the credibility of glove performance claims.

To score gloves into their appropriate level, impact protection testing under ISEA 138 requires consistent, regulated tests on each kind of glove on two areas for impact performance: knuckles and fingers/thumb. On both gloves, knuckles are tested four times and fingers/thumb are tested five times.

Around
300,000

injuries or illnesses per year affect the upper extremities – with

42%

of those being injuries to the hand.*

More than **40%**

of all recordables affected the hands in the oil and gas industry.**

*source: <https://www.bls.gov/>

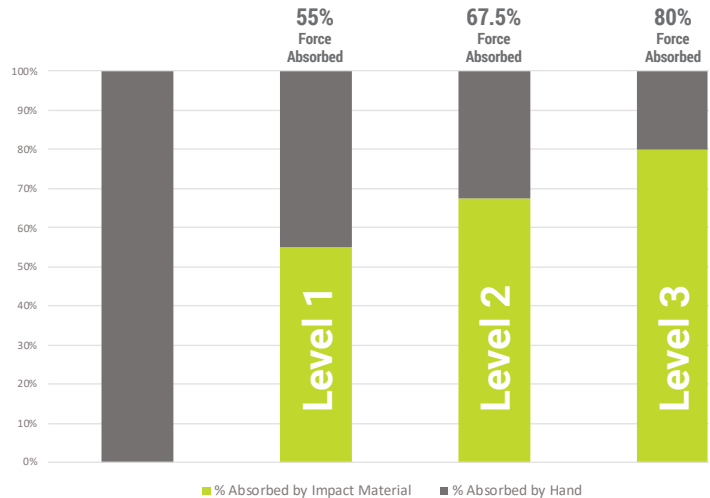
** source: <http://www.iadc.org>

To start, one pair of gloves is required per test. The gloves are cut in half and the back-of-hand (where the impact protection is located) is placed on an anvil. A striker with a force of 5 Joules is dropped on the required back-of-hand locations, and the amount of force transferred through the glove back-of-hand is recorded with a force gauge that is connected below the anvil and measured in kiloNewtons (kN).

Scoring

The average of eight knuckle tests are compared to the average of the ten finger tests. The highest average of the two is the impact testing score.

- **Performance Level 1** – Results in an average peak transmitted force of greater than or equal to 9 kN.
 - 55% of force absorbed
- **Performance Level 2** – Results in an average peak transmitted force of 6.5 to 8.1 kN.
 - 67.5% of force absorbed
- **Performance Level 3** – Results in an average peak transmitted force of 4 to 5 kN.
 - 80% of force absorbed



The chart showcases the ISEA 138 performance levels, with “Performance Level 3” being the highest. Any impact-resistant PPE that scores higher than a 9 kN force transfer will not qualify for a ranking and will fail.

With no impact material, the machine registers around 20kN, so in order to pass the test, the impact material must register less than 9kN, reducing the force or energy transferred by 55%. The anvil will drop roughly around 5 ½ pounds from 8 inches.




The Difference Between EN 388 and ISEA 138

The European industrial glove market was the first to add an impact testing element to their EN 388 standard in 2016, which was updated to include impact testing performance ratings. Although the EN 388 testing method is similar to ISEA 138, the testing areas and scoring are quite different, and understanding that difference is what makes this change so significant.

EN 388 only tests the impact on the knuckles, and the tests are given a basic score of Pass (P) or Fail (F); an untested glove will be given a score of Not Tested (X). To pass the test, the transmitted force needs to be less than or equal to 7 kN with no single results greater than 9 kN. The score of P, F, or X is designated by the arrow in the diagram on the right.

A wide variance in performance still exists within this “pass” category on its own, and quality of PPE product design, materials used, and the construction process could create drastic differences in longevity and performance of impact resistance based on this test result.

EN 388 Impact Standards Knuckle Only ISEA 138 Impact Standards Knuckle and Fingers

	EN	ISEA
Tests	4 Tests	18 Tests
Levels	Pass/ Fail ≤ 7kN EN Reference Digit 4244XX ↑	 1 ≤ 9kN Level 1  2 ≤ 6.5kN Level 2  3 ≤ 4kN Level 3

The distinguishing feature of ISEA 138 is the inclusion of knuckles and fingers in the testing phase, as well as listing test results with performance levels ranking of 1, 2, or 3. This inclusion of fingers is critical for industrial glove users, whose fingers are usually at a high risk for injury, as is the three level ranking system, which gives more choice and flexibility to the end-user in matching appropriate level of impact protection based on the hazards they face.

Additionally, unlike the current EN 388 impact standard, ISEA 138 is specifically designed for industrial gloves and the special protection they offer to workers. This differs slightly, as EN 388 took cues from an existing motorcycle impact standard for hand protection.

Setting the Bar Higher

The new standard raises the bar for testing requirements within a standard, as ISEA 138 requires testing in a lab that meets the laboratory conformity assessment standard IOS/IEC 17205. This is the first ANSI/ISEA standard to require third-party testing, where unlike most standards from ANSI, PPE manufacturers are on an honor system when it comes to publishing test results.

Strict guidelines for the testing device, including weight and velocity specifications for the anvil, must be followed and measured consistently to help increase the credibility of glove performance level claims. This is a huge improvement for ANSI/ISEA glove industry standards across the board.

Impact Technology Redefined

As a member of the ISEA board and their hand protection sub-committee group, HexArmor® has been working closely with the ISEA and other leading glove manufacturers to develop and implement this standard for the past few years. Even before the standard published in February 2019, many glove manufacturers, including HexArmor®, were taking steps to test their gloves to the proposed standard to ensure their compliance and protection.

Cellutek™, a new impact technology from HexArmor®, was designed to create a more powerful back-of-hand impact protection system for workers. Made from a proprietary material, Cellutek™ is a full back-of-hand impact protection system that's sewn into the glove. The impact absorbing properties layered with thermoplastic rubber (TPR) impact material dampens blunt forces, dissipating the blow from the impact so it can recover quickly. The Cellutek™ line of gloves by HexArmor® offers Level 2 and Level 3 ISEA 138 tested impact protection.



About HexArmor®

HexArmor®, an industry leader in PPE and safety technology, is redefining hand protection. Since day one, we've worked to address unsolved issues in hand safety with our manufacturing, engineering, design, and technical expertise.

We work side-by-side with safety professionals in a never-ending effort to provide the most complete protection for any given hazard, application, or task. We encourage all safety managers, regardless of their industry or application, to consult one of our qualified Solution Specialists for an in-depth, collaborative solution development session to see how our products reduce injury and protect people at your organization. Once field tested, we're confident you'll agree.