Cut Test Methods Whitepaper

This content refers to standards set prior to 2016. For updated information on cut standards, refer to the HexArmor Learning Center.
CUTTING THROUGH CUT TESTING CONFUSION

As simple as the industry may try to make it sound, there remains an unsettling level of confusion in the cut-resistant glove market. With multiple 1-to-5 rating scales, a variety of acceptable or certified standards and methods, differing testing methods, and a slew of acronyms associated with the testing, safety managers may find themselves overwhelmed when sifting through potential cut-resistant PPE.

But there is one thing that is met with general agreement in the hand-safety industry: not all cut-resistant gloves are created equal. With this in mind, it becomes vitally important that those making the PPE purchase decisions be fully informed on the cut-resistant products available to them. Here is what you need to know about cut testing standards and how they apply to your safety program:

The United States Uses ANSI/ISEA-Accepted Standards, While Europe Uses CEN Certification

However, many gloves sold in North America will indicate both testing results. Keep in mind that the ISEA (International Safety Equipment Association)/ANSI (American National Standards Institute) is a committee of manufacturers and suppliers of safety equipment, as well as a group of standardization societies, which have appointed a standardized test for cut-resistant materials. On the other hand, the CE (Conformité Européenne) marking of a glove is an actual certification, verifying a product has been properly tested, and the test results properly reported. Many manufacturers in North America will seek CE compliance, as it is required in Europe and other parts of the world.

ANSI/ISEA Accepts The ASTM Cut Test Standard, While The CE Certification Accepts The EN388 and ISO Test Standards

While both parties report cut resistance on a numerical scale from Level 1 to Level 5, there are differences in these scales. A glove with ISEA/ANSI Level 3 cut resistance may not necessarily test at Level 3 on the CE method. The reason for this difference in the rating scale is the difference in accepted testing methods:

- The ASTM F1790 measures the weight in grams needed to cut through a material when applied to a razor blade, tested over a distance. Thus, each cut from 1 to 5 denotes a specific range of weight, in ascending order.
- The EN388 Coup testing method is constructed much differently; it counts the rotations needed for a circular blade to cut through a material while moving laterally across the material under one constant weight. The count is indexed by use of a “control” fabric, such as standard cotton. This indexed value is then converted to a simple cut level, ranging from Level 1 to Level 5.

Compare The Best with The Rest: CE vs. ANSI/ISEA Cut Chart
The EN388 Coup test is not recommended for materials with high levels of cut resistance, as these materials can easily dull the blade and skew the results. For CE Cut Levels of 4 and 5, an alternate test is proposed: the ISO 13997. Similar to the ASTM F1790, it measures the force needed to cut a material by way of a straight blade being moved across said material. The result is measured in newtons, which is directly translated to cut resistance.

The ASTM F1790-97 Varies Slightly From the ASTM F1790-05

Prior to 2004, a cut length of 25mm was required when performing the test; the specifications have since been updated to require only 20mm. The update was made so that both the Tomodynamometer (TDM) and Cut Protection Performance Tester (CPPT) testing machines would be comparable. Be certain when comparing data that the same test is used for each product in the comparison.

North American Manufacturers and Distributors Are Not Required to Certify Their Cut Resistance

As the CE is the only certification-requiring body, vendors of safety gloves in North America are able to sell gloves without ever testing them for cut resistance. If they elect to test them for cut resistance, they are able to use any method they choose. Furthermore, the CE certification does not require the ISO 13997 for highly cut-resistant materials, but only recommends it. As such, a manufacturer of PPE in North America could feasibly run the EN388 Coup test on a cut-resistant material and, due to the nature of the test, return dramatically inaccurate results that portray the material to be far more resistant to cuts than it is in actuality. It is extremely important to gather information both about the material used in PPE, as well as the methods by which it is tested, before continuing with a purchase decision.

The Employer Is Ultimately Responsible for Providing PPE That Meets Employees’ Needs

Per OSHA regulations, the final burden of responsibility concerning cut resistance falls on the employer. Though testing regulations and certifications are a viable starting point for a purchase decision process, they are never to be taken as a validation of the inherent protection offered to an employee.

Cut-Resistant PPE Manufacturers and Suppliers Can Provide Further Understanding of Cut Testing

Ask them questions, and seek thorough explanations for the methods that they have selected to test their products. More information on each of the tests listed can be found on these websites:

- www.astm.org
- www.iso.org
- www.cen.eu