RITZ SAFETY

Learning Guide:

EN 388 Standard

FOR PROTECTIVE GLOVES AGAINST MECHANICAL RISKS (2016 EDITION)

What is the EN 388: 2016 Standard?

EN 388 is a European safety standard for protective work gloves , providing comprehensive assessment for their resistance to mechanical risks in a work environment. The standard evaluates gloves based on their performance against abrasion, cut, tear, puncture, and impact, ensuring that users can select the appropriate hand protection for various industrial and occupational hazards. Following EN388 guidelines ensures that both manufacturers and users can have confidence in the reliability and safety of their hands whilst carrying out work.

EN 388 2016 Standard

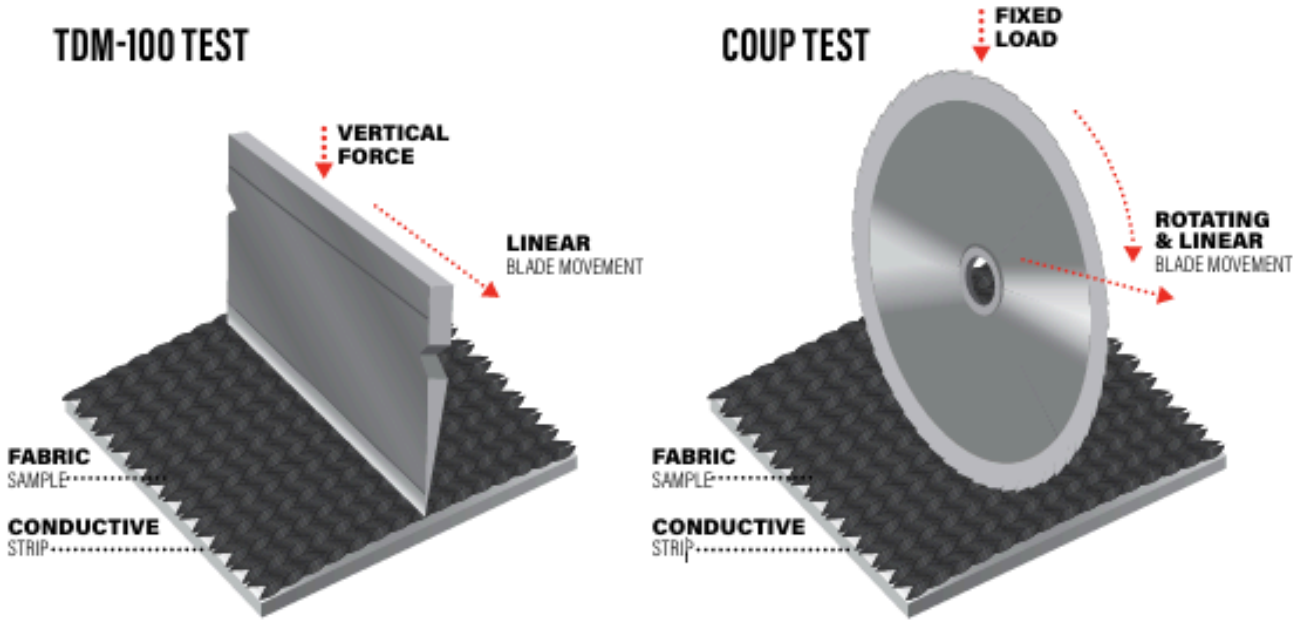
Currently, on many cut resistant gloves sold in North America, you will find the EN 388 marking. The EN 388, similar to ANSI/ISEA 105, evaluate the mechanical risks for hand protection. Gloves with an EN 388 rating are third party tested for abrasion, cut, tear, puncture and impact resistance. Cut resistance is rated 1-5 while all other physical performance factors are rated 1-4. Up until 2016, the EN 388 standard used only the “Coup Test” to test for cut resistance. The current standard uses both the “Coup Test” and the “TDM-100 Test” to measure cut resistance for a more accurate score. Also included in the standard is an Impact Protection test.

EN 388 Gradings

	Rating
Abrasion	1 - 4
Cut (Coup)	1 - 5
Tear	1 - 4
Puncture	1 - 4
Cut (TDM)	A - F
Impact	P, F, X

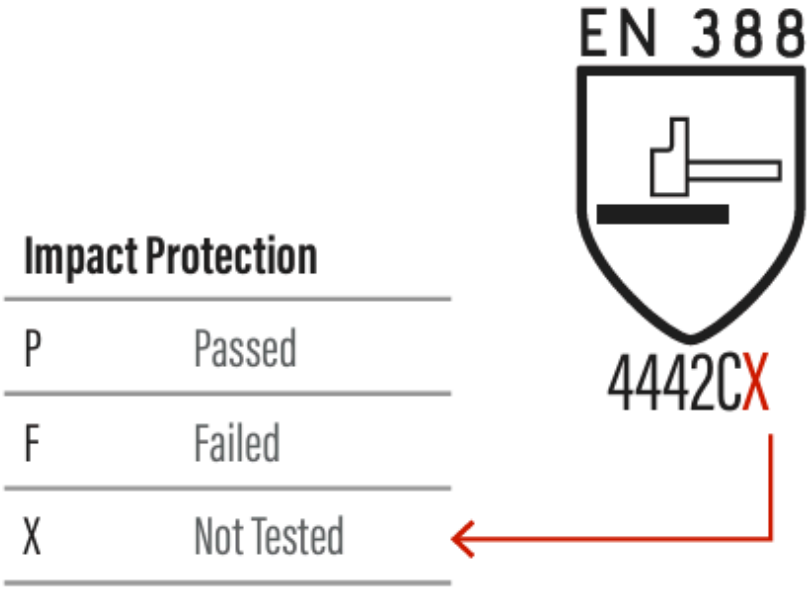
Two Testing Methods for Cut Protection

After many years of using various testing methods for hand protection, it was discovered that the blade in the “Coup Test” would dull quickly when testing yarns with high levels of glass and steel fibers. This led to unreliable cut scores, highlighting the need for the inclusion of the “TDM-100 Test” to incorporate the EN 388 standard to ensure more accurate hand protection assessments.



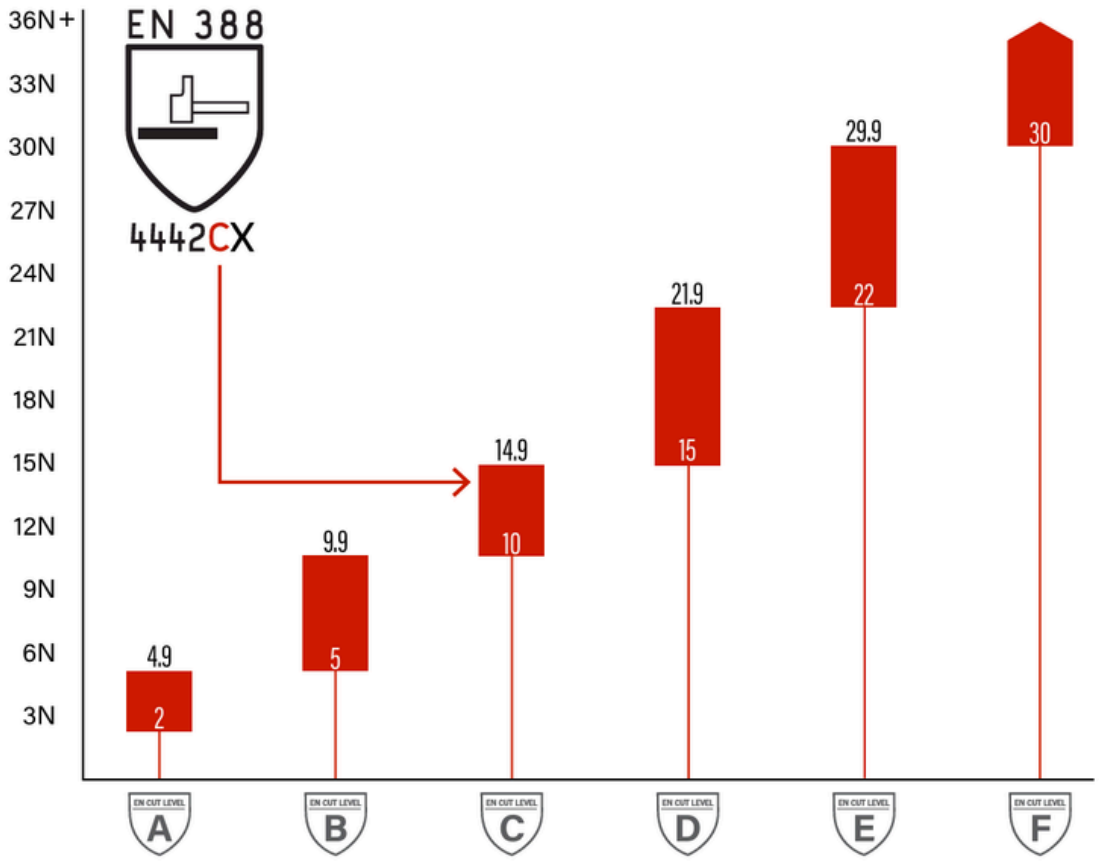
Impact Protection Testing for Maximum Safety

The EN 388 2016 standard also includes an impact protection test. This test is intended for work gloves designed for ultimate hand protection against impact. Gloves that don't offer impact protection, will not be subjected to this test. For this reason, there are three potential ratings that will be given, based on this performance test, P (pass), F (fail) or X (not tested).



Understanding the ISO 13997 Test Method (TDM-100 Test) for Superior Cut Protection

To differentiate between the two cut scores that are generated under the EN 388 2016 standard, the cut score achieved using the ISO 13997 test method has a letter added to the end of the first four digits. The letter assigned is dependent upon the result of the test, which is given in Newtons. The table to the left outlines the alpha scale used to calculate the results from the ISO 13997 test method.



UNDERSTANDING THE STANDARDS: ANSI/ISEA 105-2016 VS EN 388:2016

There are two standards used worldwide to evaluate the protection levels of work gloves: ANSI/ISEA 105-2016, the US Standard developed in tandem by the American National Safety Institute (ANSI) and International Safety Equipment Association (ISEA) and EN 388:2016, the European Standard. Each standard has established testing methods for cut, abrasion, puncture, and tear resistance. Although both standards ensure that the wearer is protected against the same mechanical risks, they are not equivalent and cannot be compared as such.

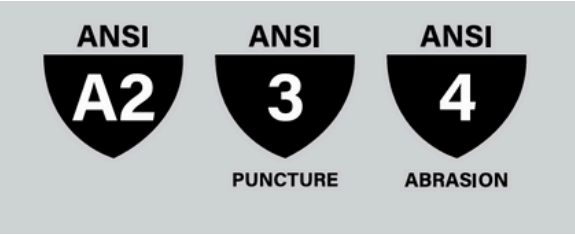
Glove Markings and Classification Systems

When assessing the protection levels of gloves, it is important to note both the US and European classification systems, as many gloves will show both markings.

ANSI/ISEA 105-2016

The ANSI/ISEA 105-2016 standard has separate markings for cut, abrasion, and puncture resistance as each protection classification is tested separately. Unlike EN 388:2016, tear resistance is not covered, and impact resistance is tested under a different standard, ANSI/ISEA 138-2019.

The ANSI/ISEA standard features nine cut levels and five abrasion and puncture levels that can be characterized by a unique shield with the protection level noted in number form.



EN 388:2016

Currently on many cut-resistant and non-cut resistant gloves sold in North America, you will find the EN 388 marking. Gloves with an EN 388 rating are third party tested and the marking notes that they are rated for cut, abrasion, puncture, tear and as of 2016, impact resistance.

You will notice that this standard includes two cut ratings – the first determined by the Coup Test that features five numerical cut levels, and the second, which was added in 2016 to achieve a more accurate score, is determined by the TDM-100 Test and features a letter scale A-F. The impact resistance test is optional and only applies to gloves claiming back-of-the-hand impact protection. There are three potential ratings that will be given: P for Pass, F for Fail, or X if it has not been tested.

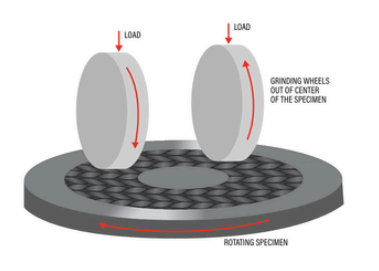
Comparing the Testing Methods

Although there are many similarities between the testing methods and instruments used for both ANSI/ISEA 105-2016 and EN 388:2016, there are also many differences that are important to note in order to fully understand each testing process. The graphics below contain a breakdown of the components of each standard that can be used as a guide to better understand each performance outcome.

ANSI/ISEA 105-2016 TESTING METHOD

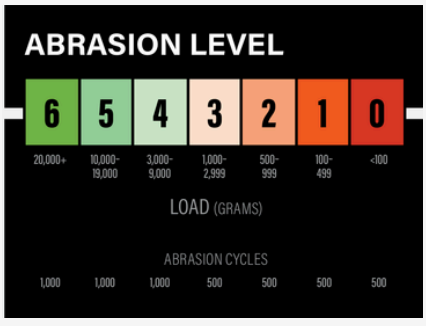
Abrasion
ANSI/ISEA 105-2016

Taber Test



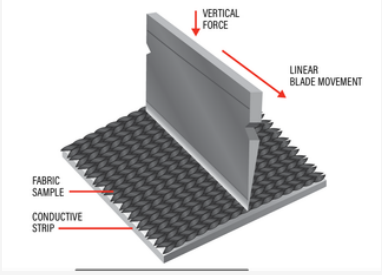
The Taber Test involves securing the test fabric on a rotating disc while two wheels with a 180 grit abradant such as emery board or sandpaper, rub the fabric in a circular motion. The number of cycles that the fabric can endure before is shows noticeable wear determines the abrasion rating on a 1-6 scale. This method is the most favored due to the wide range of materials it can test.

Test Method:
ASTM D3884-09 (uncoated)
ASTM D3884-10 (coated and unsupported)



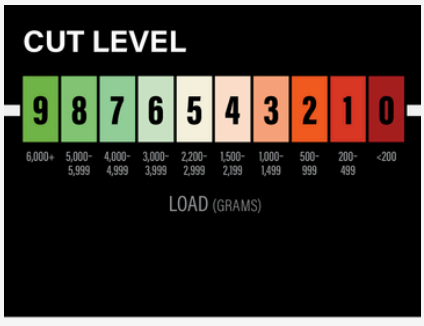
Cut
ANSI/ISEA 105-2023

TDM-100 Test



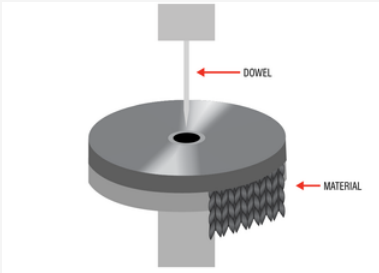
The sample is cut by a straight-edge blade, under a specific weight load that moves along a straight path. The sample is cut five times at three different weight loads, referred to as a cutting force, with a new size blade -- short, medium, and long -- for each load, providing 15 data-points. The cutting force is then used to determine the appropriate cut level.

Test Method:
ASTM F2992-15



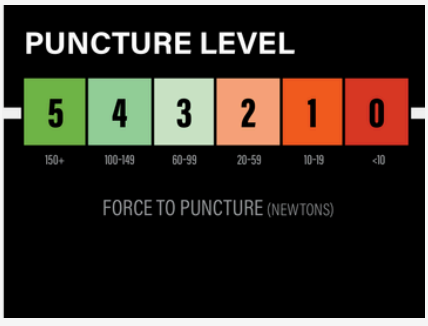
Puncture
ANSI/ISEA 105-2016

Blunt Puncture Test



The Blunt Force Puncture Testing uses a 4.5mm probe, resembling a ballpoint pen, at a 90-degree angle to simulate a tear or burst hazard. The test measures the amount of force needed for a blunt probe to pierce through PPE material at a rate of 100mm per minute.

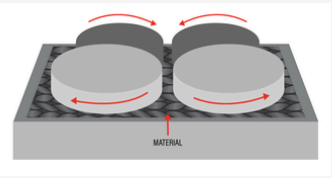
Test Method:
ASTM F1342-2022



EN 388:2016 TESTING METHOD

X X X X X X

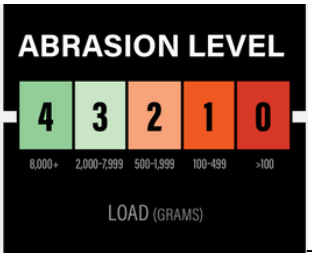
Abrasion



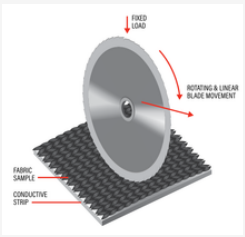
Martindale Test

The Martindale Test uses a similar rotating disc to the Taber Test but rubs the fabric in a figure eight motion. The number of cycles that the fabric can endure before it shows noticeable wear determines the abrasion rating.

Test Method: EN ISO 13997



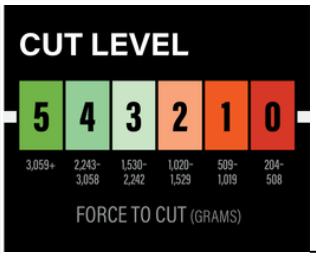
Cut (Coup)



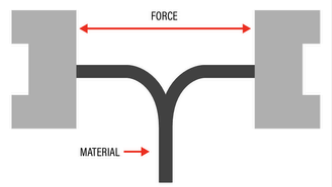
Coup Test

The Coup Test is conducted using a circular blade that rotates in cycles and moves back and forth along the same piece of material until the material is cut through. The test uses the same amount of force on all samples. Materials that achieve a higher cut score will contribute to the dulling of the blade.

Test Method: EN 388:2016



Tear

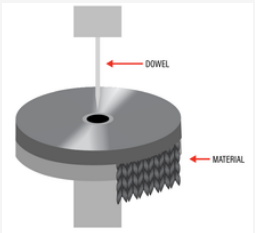


Tear Resistance Test

The EN388 Tear Resistance Test is measured by testing the tensile strength of a glove by applying force to four separate tear points on the fabric. The force is increased until the material is torn. The amount of force used to tear the material is recorded and categorized on a 1-4 scale.

Test Method: EN ISO 13997

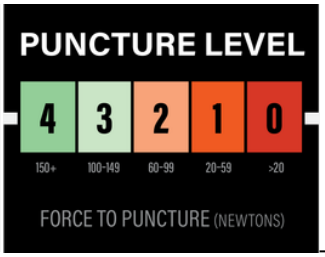
Puncture



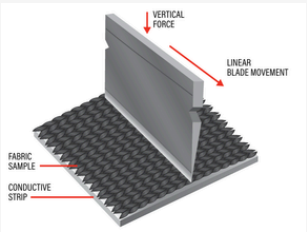
Blunt Puncture Test

The Blunt Force Puncture Testing uses a 4.5mm probe, resembling a ballpoint pen, at a 90-degree angle to simulate a tear or burst hazard. The test measures the amount of force needed for a blunt probe to pierce through PPE material at a rate of 100mm per minute.

Test Method: EN 388:2016



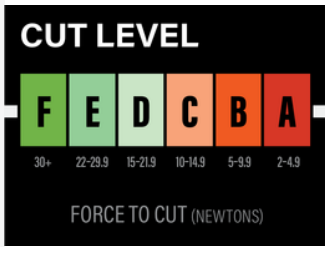
Cut (TDM-100)



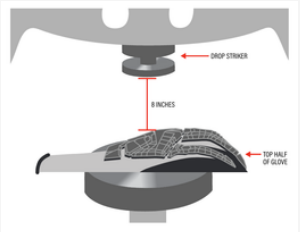
TDM-100 Test

The sample is cut by a straight-edge blade, under a specific weight load that moves along a straight path. The sample is cut five times at three different weight loads, referred to as a cutting force, with a new size blade — short, medium, and long — for each load, providing 15 data-points. The cutting force is then used to determine the appropriate cut level.

Test Method: EN ISO 13997



Impact



Impact Protection Test

The sample is cut open and laid out flat over a raised anvil. A 2.5kg striker force is dropped on the knuckles at an impact force of 5 joules. If the average transmitted force is less than or equal to 7kN, the gloves will be marked P for Pass. If the average transmitted force is higher than 9kN, the gloves will be marked F for Fail. Gloves that have not been tested will be marked X.

Test Method: EN 13594

Frequently Asked Questions:

Are EN 388 and ANSI 105 ratings directly comparable?

No, not directly. EN 388 and ANS 105 are not equivalent and cannot be compared as such due to the various testing methods used within each standard.

How do I interpret the test results for gloves under EN 388 and ANSI 105?

Look for the specific ratings (i.e., 4 for abrasion resistance in EN 388 or A3 for cut resistance in ANSI 105) and consider how they align with the tasks and hazards your workers face. Higher ratings generally indicate better protection.

Which standard should I follow for selecting gloves?

This depends on your region and specific requirements. While most gloves sold in the US will have both markings, EN 388 is widely used in Europe and many other parts of the world, while ANSI 105 is commonly used in North America. Understanding local regulations and job-specific risks can help determine which standard to prioritize.