WATSON GLOVES
Quality since 1918

Cut Resistant Series Vol. 19

THE BASICS

Cut and puncture wound hazards in the workplace come from handheld sharp cutting tools which includes knives, razors, pruners, chisels, snips, etc., as well as the handling of materials such as metal, glass, and sharp-edged plastics. These types of hazards can be reduced through training employees to choose, store, and use tools properly, and ensuring maintenance and repair of sharp and cutting tools. Another means of protecting employees is with personal protective equipment (PPE)—namely cut resistant gloves.

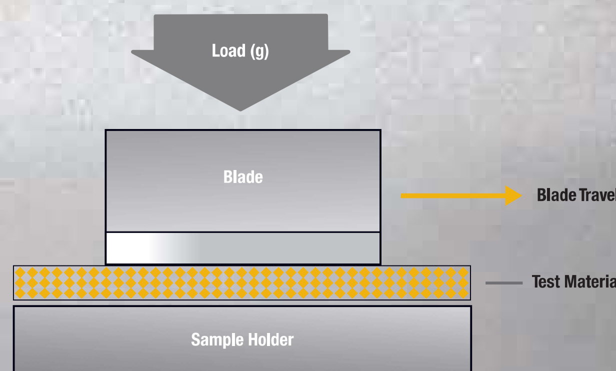
This guide is all about cutting. Although topics such as abrasion, puncture, and tear are mentioned, they are all very different forms of breaking apart material. You will read below about the two methods of testing cut resistance which our gloves are rated by. Please note, cutting gloves with a pair of scissors involves ‘shear’, which is a different kind of force from the slicing type of cut faced in industrial applications. Scissors have 2 sharp blades applying stress in both directions. Cut resistance can not be categorized through scissor tests.

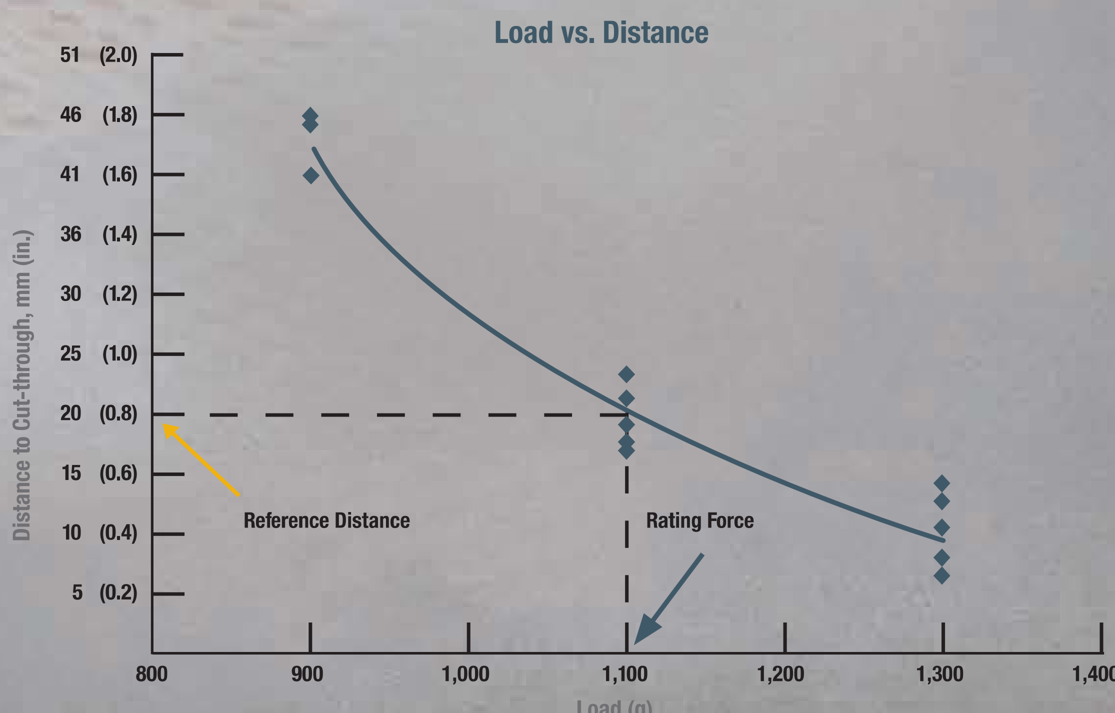
It is important to keep in mind that there is really no such thing as a “cut proof” glove—you will never hear us describe our products as such. Work gloves can be cut resistant, but with enough pressure, all gloves will allow a sharp-edged object through. How well the glove performs also depends on how you maintain the glove—the manufacturer’s recommendations for glove care need to be followed for optimum performance.

Ultimately, being educated about risks and hazards in the workplace is what protects us the best.

ISO 13997 Test Method

In the ISO 13997 test methods, the sample is cut by a straight-edge blade, under load, that moves along a straight path. The sample is cut five times each at three different loads and the data is used to determine the required load to cut through the sample at a reference distance of 20 mm (0.8 in.). This is referred to as the Rating Force or Cutting Force (Refer to Diagram below). The higher the Rating Force, the more cut-resistant the material. Neoprene rubber is used as the standard to evaluate blade sharpness.





CUT RESISTANT STANDARD

In January 2016 the American National Standards Institute (ANSI) introduced a new standard called the ANSI/ISEA 105. The goal for updating this standard was to create consistency between ANSI and EN388 methods as well as to account of the recent advances in cut resistant yarns and technologies. Both the new ANSI F2992-15 cut test method and EN ISO 13997 now use the same TDM-100 machines and as a result, their scores now roughly correlate as you can see illustrated in the chart below.

The 2016 revision of the ANSI/ISEA 105 standard is a more expanded level of classification of cut resistance:

- The ANSI ASTM F2992-15 cut test method now features 9 levels of cut resistance: A1-A9 with smaller increments between levels
- Additional levels have also been added to the higher end of the cut resistance scale to account for new cut resistant materials and technologies coming on to the market.

For the EN 388 cut test ratings, both the Coup Test cut score and ISO 13997 rating are required to be represented on the En 388 score

- The new ISO 13997 rating is represented by the letters A-F at the end of the score

EN388 AND ANSI PICTOGRAMS

EN388: 2016 Pictogram:

The EN 388 rating is scored from (A-F)

CE

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EN 388

- Abrasion Resistance Rating
- Cut Resistance Rating (Coup)
- Tear Resistance Rating (Newtons)
- Puncture Resistance Rating (Newtons)
- Cut Resistance Rating (TDM Score)
- Impact Resistance Rating

ANSI F2992-15 Icon:

The ANSI ratings is scored from A1-A9

ANSI

A#

CHOOSE YOUR CUT LEVEL

ANSI F2992 – 15 — Cut rating from A1-A9 (9 levels) — Measured in Grams of Force 1gf = 0.0098N — ANSI A#

EN388: 2016 — EN 388 XXXXX — Measured in Newtons 1N = 101.97gf — Cut rating from A-F (6 levels)

Materials	ANSI (gf)	ANSI	EN 388	EN 388 (N)	Application
Metal Mesh	6000+ gf	A9			**Extreme** Glass Manufacturing, Recycling Sorting, Metal Fabrication
	5000 - 5999 gf	A8			
Engineered Yarns	4000 - 4999 gf	A7			**High** Automotive Assembly, Pulp Paper, Aerospace Industry
	3000 - 3999 gf	A6	F	30 N (3059 gf)	
	2000 - 2999 gf	A5	E	22 N (2243 gf)	**Moderate** Manufacturing, Warehouse, Food Prep, Packaging
	1500 - 1999 gf	A4	D	15 N (1529 gf)	
	1000 - 1499 gf	A3	C	10 N (1019 gf)	
Synthetics Polyester/Nylon	500 - 999 gf	A2	B	5 N (309 gf)	**Low Hazards** General purpose material handling with sharp edges
	200 - 499 gf	A1	A	2 N (203 gf)	

TYPES OF CUTS

THINGS TO CONSIDER WHEN CHOOSING GLOVES

TYPES OF CUTS:

Slicing
Caused by the sliding of the skin across a very sharp edge. The sliding action can be a result of the hand or other skin surface sliding across the sharp edge or by the sharp edge sliding across the stationary hand or other skin surface. Examples of this type of cut would be a slip of the knife when dicing vegetables.

Abrasions
This type of cut is the process of scraping or wearing away. The surface may or may not be sharp/jagged.

Punctures or Impact Cuts
These result from sharp or pointed objects impacting the skin (falling pane of glass or sheet of metal). Punctures are often categorized as cut hazards because they cause lacerations. When dealing with this type of hazard, it is important to remember that the initial protection needed is not cut resistance, it is puncture resistance—they are not the same thing. The hand is getting cut because the barb or shard is penetrating the surface of the glove. A coating or leather patch can be added to the glove surface to help prevent shards from penetrating.

Edge Sharpness
All edges are sharp, however, a true assessment of this hazard can reduce the likelihood of cut incidents and decrease the severity of them, should they still occur. There are many different types of cut resistant fibers to choose from, and each has a cost and/or protection benefit that can be evaluated.

Edge Roughness
Thin gauge sheet metal has a smaller burr when stamped or punched than thicker gauge sheet metal. Bigger burrs or rougher edges require thicker or heavier weight gloves. The thickness will prevent the burr from penetrating the glove and cutting the hand. Heavier weight gloves will wear longer when exposed to rougher edges. Yarns with higher tensile strength combined with abrasion resistance are required in these applications.

Surface Texture
Dry surfaces require gloves with grip. Oily surfaces require gloves with absorption in order to get a good grip. Different grips can be added to cut resistant gloves by dipping, dotting, or screening.

Moving Edges vs. Stationary Edges
Moving edges require thicker gloves because the edge tears the glove surface as it passes along the palm. Thickness, in this case, equates to wear resistance. Stationary edges require less reinforcement. It is important to note the moving edge referenced here occurs when a hand slides along a piece of metal or glass as it is grabbed. No glove can protect against a moving or rotating blade.

Assembly
Hand cut injuries often occur in sheet metal assembly areas where moving parts (nuts, bolts, and screws) are driven with automatic wrenches and screwdrivers. As a general rule, knit gloves should not be used in these areas because they can catch on the edge of a turning screw or bolt as it is driven. Gloves with a tacky grip can pose the same hazard. Gloves knit with cut-resistant fibres can be dipped with coatings that encapsulate the knit fibres and provide dry, wet, and oily surface gripping without being tacky.

CUT FIBRES + MATERIALS

FIBRES/ MATERIALS

Cut Shield™
Cut Shield™ is a cut resistant ANSI A4, A5, A7 liner made from a blend of P-aramid, glass and polyester fibres.

Kevlar® Aramid Fibre
DuPont™ Kevlar® is an extraordinarily strong, light, and flexible material, highly cut and heat resistant. It is inherently flame resistant and self-extinguishing—thread made of Kevlar® fibre is used to sew seams on temperature-resistant gloves. This makes Kevlar® work gloves useful for welding and manufacturing facilities such as glass plants and refineries. Kevlar® also finds use in automotive manufacturing, lumber falling, law enforcement, veterinary or animal control operations, construction, steel and metal working applications, and garment manufacturing.

Leather & Cotton
One of the most common misconceptions when dealing with cut resistance is that leather is a good cut resistant material. While it is true that an extremely thick leather glove will provide some degree of cut resistance, pound per pound cotton actually has a greater cut resistance than leather. In order to have any degree of protection, the leather has to be so thick that it becomes a very uncomfortable glove that leaves you with little dexterity. The primary reason you need cut resistance gloves is because your skin cuts very easily. And, since leather is just skin of an animal, it cuts just about as easily.

Though we have a couple leather gloves in our cut resistant guide, they have Spectra® fibre linings, which is where the majority of the cut resistance is derived.

FOUR FACTORS THAT INFLUENCE CUT RESISTANCE OF A GLOVE

1. Strength of the yarns - hi tensile strength yarns are Kevlar® and Dyneema

2. Harness (dulling) - stainless steel woven into the yarn will increase its hardness

3. Lubricity (Slickness) - slippery yarns like Spectra and Dyneema will allow the blade to slide over its surface

4. Rolling actions (Knit construction) - most gloves will allow the yarns to roll as the sharp edge slides across without cutting the metal

The type of coating (nitrile, latex, pu, etc.) can affect the cut resistance as well. The more of these factors that can be engineered into a glove, the more cut resistant it will be.