

Mesh Gloves 101

Imagine depictions of King Arthur and his Knights of the Round Table draped in chain mail garments and gloves. It was then that the concept of metal mesh gloves was born — in the Middle Ages when European knights wore gloves made of chain mail to protect them from puncture of the swords and lances used in jousts and battles. Evolution of those ring-mesh garments has lead to today's steel mesh safety glove.

Leap forward 1,500 years to the workers of today. Metal mesh gloves have been modernized, but at their root they are still woven together with thousands of individually formed metal rings. Early modern mesh gloves were manufactured of nickel-plated brass. In the 1980s almost all manufacturers of mesh gloves had switched to stainless steel. The original metal mesh safety gloves also had a fabric strap around the wrist to close the glove around the hand.

Who uses mesh gloves and when?

Several different industries, including textile cutting and sheet metal, use metal mesh gloves for cut protection. However, the most popular user of metal mesh gloves remains in food processing. In the food-processing industry, anyone who uses a hand knife or cleans/moves a slicer blade can (should) wear a metal mesh glove. Why? Just like the Knights of the Round Table learned, there is no product better at protecting from cut and puncture. But it is very important to note that even metal mesh gloves are neither cut-proof nor puncture-proof. They are cut-resistant and puncture-resistant, and they are the most cut-resistant option available. But no glove is 100% cut proof. Mesh gloves are only designed to be used around hand knives, not any powered blades or saws with serrated edges. This is why there are warnings on the packaging from almost all manufacturers that read something like:

- “WARNING: these gloves will not withstand the force of power-driven blades, saws, and tools; avoid this hazard.”
- “WARNING: These gloves could be caught in moving machinery and should not be used where such contact is possible.”

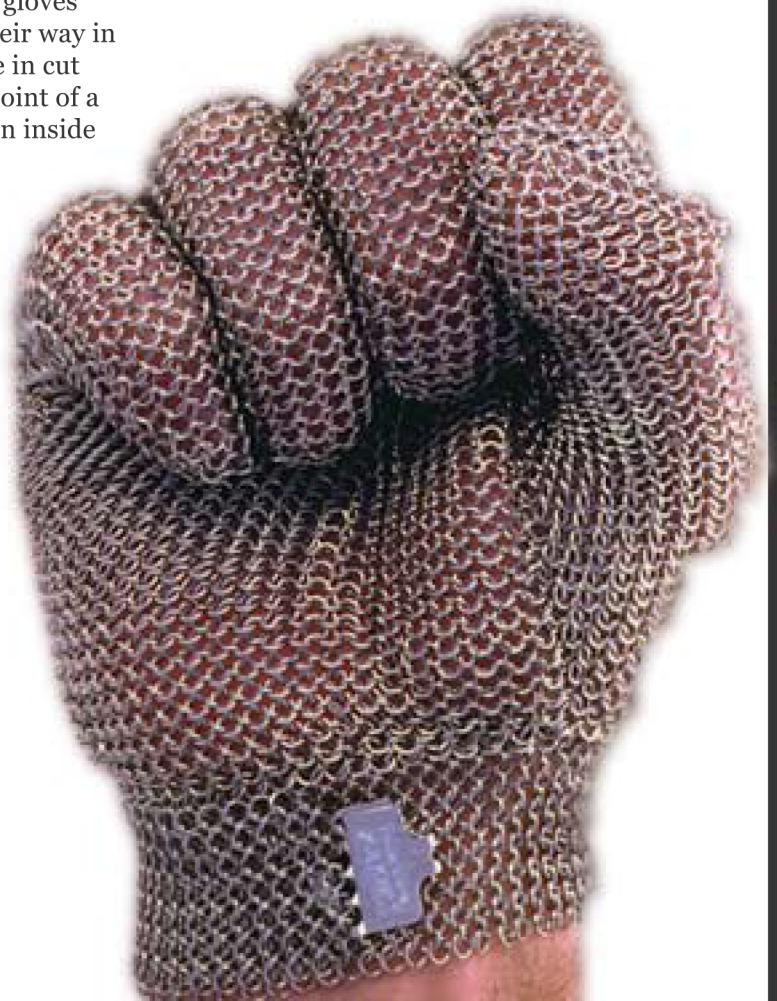
Mesh gloves provide different protection from knit cut-resistant gloves. Knit cut-resistant gloves can offer some cut protection, but some of the fibers used can abrade over time. Additionally, cut-resistant gloves offer limited puncture protection, as knife points can find their way in between the knit fibers. Metal mesh gloves offer the ultimate in cut protection and also puncture protection. Only the smallest point of a knife can slightly penetrate a mesh glove, as the rings have an inside ring diameter of only a few millimeters.

What does the law state about mesh gloves?

There is no OSHA standard or regulation that requires metal mesh gloves to be used in any specific industry or application. However, OSHA has published the reference document OSHA 3108, “Safety and Health Guide for the Meatpacking Industry.” It can be accessed online at <http://www.osha.gov/Publications/OSHA3108/osh3108.html>.

In the section labeled “Protective Clothing and Equipment,” in the last sentence of the first paragraph, you will find this: “In addition, workers who use knives must be provided with metal mesh gloves and aprons, and wrist and forearm guards to protect them from knife cuts.”

How different is the meatpacking industry from foodservice or grocery or several other industries? There are workers in all of these industries using hand knives to cut food. So if OSHA says that mesh gloves should be worn in meatpacking, it seems logical that it would be a best practice to wear them for similar applications in other industries.



Mesh gloves and standards

Currently, there is no U.S. federal or state government standard about how to make a mesh glove. Manufacturers can produce gloves that appear to do the job, and then let the end user decide if the gloves suit their needs.

Several of the leading mesh glove manufacturers follow the European standard EN1082, and apply the CE mark as evidence of certified compliance. This standard covers several performance and design criteria, including ring weld (tensile) strength and ring assembly.

The tensile strength requirement, section 4.3.1 states that: "When tested ... no ring, link or plate shall break open when a force of 100N is applied." (An "N" is a Newton, a measure of force. 1 N is roughly 0.22481 pounds of force. So 100N, the minimum requirement is roughly 22.481 pounds of force.)

Additionally, section 4.2.1 states that: "Chain mail ... shall have 4 rings passing through each ring." Again, because there is no standard in the U.S. for mesh gloves, some mesh glove manufacturers only connect their pieces of mesh using one ring and not four. This is a less expensive way to make the gloves, as it is faster to assemble. However, as a result, the gaps at a glove's seams are as large as 6.3mm, allowing enough room for a knife point to protrude.

The gloves produced by leading mesh glove manufacturers are assembled by weaving the joining ring around (over and

Hygienic concerns

Now that you understand what a mesh glove is used for, and how to tell safe gloves from those not as safe, it is appropriate to reconsider the environment where these gloves will be worn. In most cases mesh gloves are worn in a slaughterhouse, food-processing or foodservice environment, a kitchen cut-up or grocery — all locations where they make contact with food.

In each of these environments almost all of the tools and knives used are stainless steel. So are many of the surface materials, transport bins, etc. Why? Because stainless steel is a non-porous material that is relatively simple to clean and will not harbor bacteria.

However, as mentioned previously, original metal mesh gloves had a fabric strap around the wrist to close the glove around the hand. With a fabric strap you are introducing a porous material to a purportedly hygienic environment. The fabric straps are challenging to clean, and they can be a place for bacteria to hide and grow — even after the most thorough cleaning processes.

Because of this concern, a new generation of metal mesh gloves was born — gloves without fabric straps. By eliminating fabric straps, you can reduce the risk of bacteria and cross contamination. This helps facilities become compliant with the USDA FSIS (Food Safety and Inspection Service) which states that: "All plants must develop, adopt and implement a HACCP (Hazard Analysis and Critical Control Point) plan for each of their processes." Additionally, FSIS, in their Standard Operating Procedures for Sanitation states: "All plants must prepare and implement plant-specific standard operating procedures (SOPs) for sanitation to ensure they are meeting their responsibility to keep their facilities and equipment clean."

Should you be wearing a metal mesh glove?

Think about your application and its hazards? Are you using hand knives? Are you cutting up food?

Initially the cost may seem prohibitive, as wrist-length gloves can cost approximately \$100 each. But if you stop and think about the costs that it can save, what is that glove really worth?

- What is the cost of cut injury to a worker? The insurance, the worker's compensation coverage, the short-term disability coverage, the lost productivity?
- What is the cost to your business if the injured person contaminates the food with blood or other biohazards?
- How much are you spending on replacing knit cut-resistant gloves when the fibers wear and the gloves are damaged? Metal mesh gloves can have the rings repaired for a fraction of the cost of a new glove.

According to a 2005 report from the Bureau of Labor Statistics, 25% of all injuries resulting in days away from work were hand related. The average cost per reportable hand injuries is a staggering \$4,200, according to the National Safety Council. BLS data had the cost of hand injuries at \$8,500 for combined medical and indemnity costs! (This includes everything from a couple of stitches to severed tendons.) An even more shocking statistic is 70% of workers suffering hand injuries were not wearing gloves! For the remaining 30%, injuries occurred because the gloves used were either inadequate or worn out.

In 2005, OSHA estimated that hand injuries cost the foodservice industry, specifically, about \$300 million a year in medical costs, lost time from work and workers' compensation insurance payouts. The U.S. Bureau of Labor Statistics reported that in 2003, nearly 24,000 restaurant workers lost at least a day of work because of a cut, burn or scald, predominantly to the hands.

Considering those statistics, the cost of a mesh glove may not seem so large.

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