

Hand Protection Standards Update-GLASC

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Kevlar Mechanical Protection Technical Sales

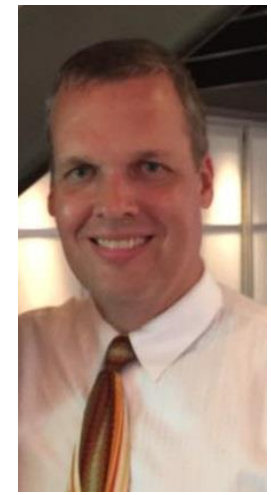
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DuPont™ Kevlar®

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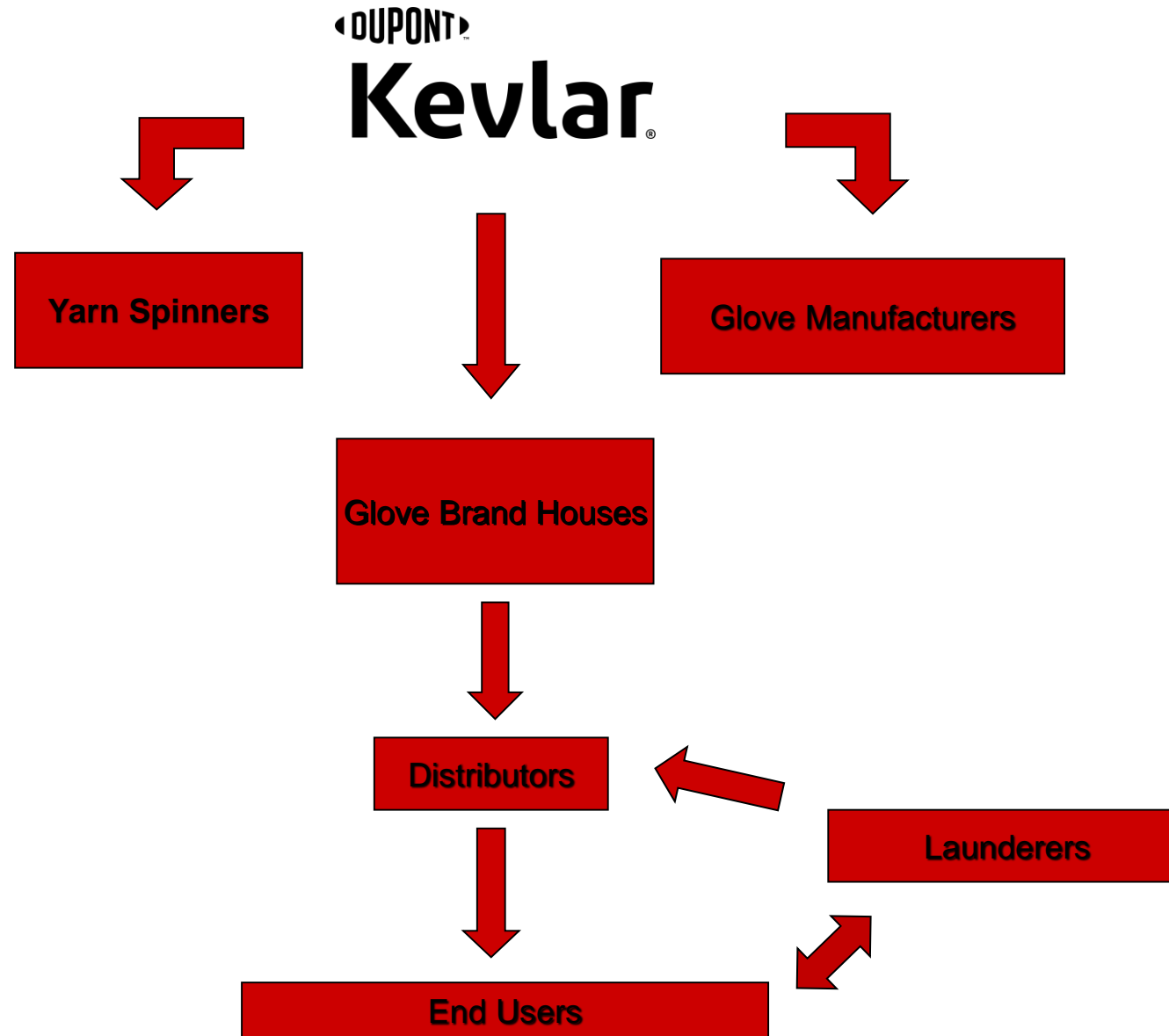
Introduction



Eric Key is Technical Sales and Laboratory manager in the DuPont™ Kevlar® business and has 23 years of experience in the development of new products and new applications. During his 23 years with DuPont, Eric started in the Automotive Finishes Division, and for the last 13 years has been in the Kevlar® & Nomex® businesses. He has worked in a variety of market segments including the automotive industry, high-performance thermal apparel, electrical insulation for motors and transformers, ballistic materials and currently with high-performance cut materials. Eric holds a B.S. in Biology(pre-Med) and Engineering-Chemistry from Oakland University in Rochester, MI. He is on ASTM committees F23(personal protection) and E54(PPE for Homeland Security) and is also a member of ANSI/ISEA committee.



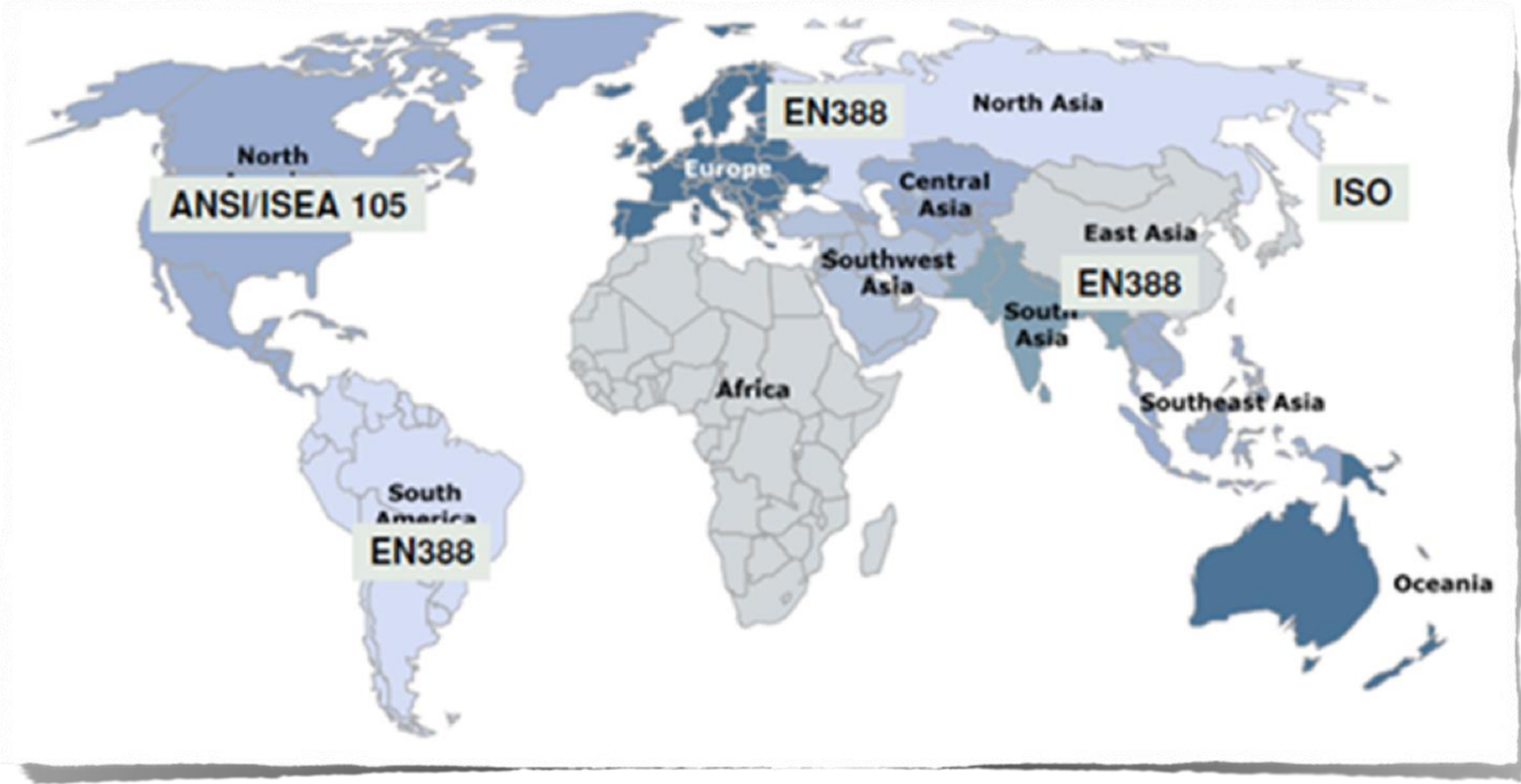
Where does Kevlar® Fit in the Glove Value Chain?



Refresher on Cut: ANSI/ISEA vs. EN



Global Recognition of Cut Standards



Hand Protection Standards

ANSI/ISEA 105-16

American National Standard for Hand Protection Classification

- US Standard only – is not a government regulation like OSHA
- Indicates the mechanical, thermal, chemical, and puncture requirements, among others
- The final performance is classified by levels (ex, “A4”)

2016 Changes Included:

Key focus was on 3 key areas:

- There was an expansion of the classification levels for cut resistance & move to a single test method
- There was a change to the test for Abrasion Resistance
- Incorporation of a puncture test for hypodermic needles



Why Were the Changes Made?

ANSI/ISEA 105-16

Glove performance in the cut-resistant market has improved tremendously in recent years as new yarns and new technologies have been developed

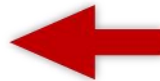
- Increased granularity was needed within the old level 4 range (1500-3499 grams)
- Industry heavily weighted towards the lower end of the old cut level

Table 1. Classification for Cut Resistance

Level	Weight (grams) needed to cut through material (25 mm of blade travel - ASTM F1790-97) (20 mm of blade travel - ASTM F1790-05)
0	< 200
1	≥ 200
2	≥ 500
3	≥ 1000
4	≥ 1500
5	≥ 3500



1600
grams



Both
ANSI 4



3200
grams



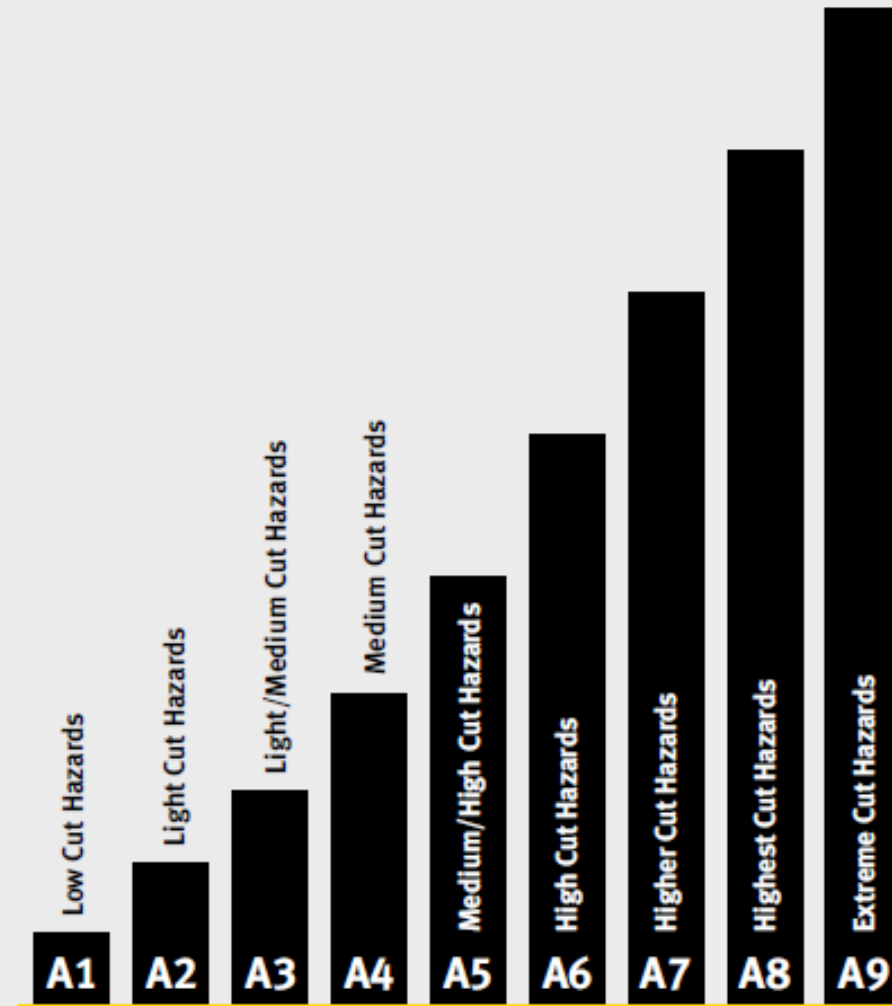
What Were the Changes?

ANSI/ISEA 105 Standards

Old Standard		New Standard	
Load (grams)	ANSI/ISEA 105-11	Load (grams)	ANSI/ISEA 105-16
<200	0	<200	-
201-499	1	201-499	A1
500-999	2	500-999	A2
1000-1499	3	1000-1499	A3
		1500-2199	A4
1500-3499	4	2200-2999	A5
>3500	5	3000-3999	A6
		4000-4999	A7
		5000-5999	A8
		>6000+	A9

Items highlighted in yellow represent the expanded ANSI/ISEA cut standards.

New ANSI/ISEA Levels at a Glance



How do these cut levels relate to MY job??

Which **LEVEL** do I choose?

*These recommendations are of a general nature and are not specific to everyone's needs. Always ensure your selected glove complies with the mandated safety standard recommended for your application.



ANSI A1: Paper cuts, material handling, parts assembly

ANSI A2/A3: Material handling, small parts handling, general purpose, warehouse, construction

ANSI A4: Bottle and glass handling, drywalling, electrical, HVAC, automotive assembly, metal handling

ANSI A5/A6: Sharp metal stamping, metal recycling, pulp and paper, automotive, aerospace industry, meat processing

ANSI A7+: Sharp metal stamping, pulp and paper, butchering, oil and gas, industrial pipe fitting, sheet metal, steel cable handling



Typical Questions Asked

What's the difference between a Regulation, a Standard, and a Test Method?

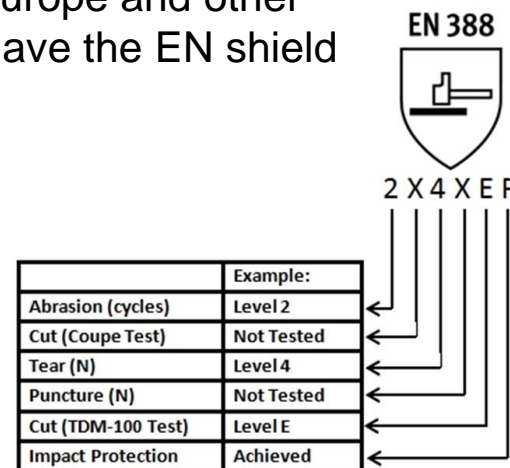
- A Regulation usually infers a legal requirement of some sort
- A Standard is used to specify Test Methods that replicate the threats potentially seen in a task
- Standards usually refer to levels that are achieved by the product tested according to certain Test Methods

Why are some gloves marked and others are blank?

- In North America, there is currently no requirement for manufacturers to label their products
- In Europe, manufacturers are required to put the product performance on the product, so gloves sold in Europe and other countries may have the EN shield on their gloves

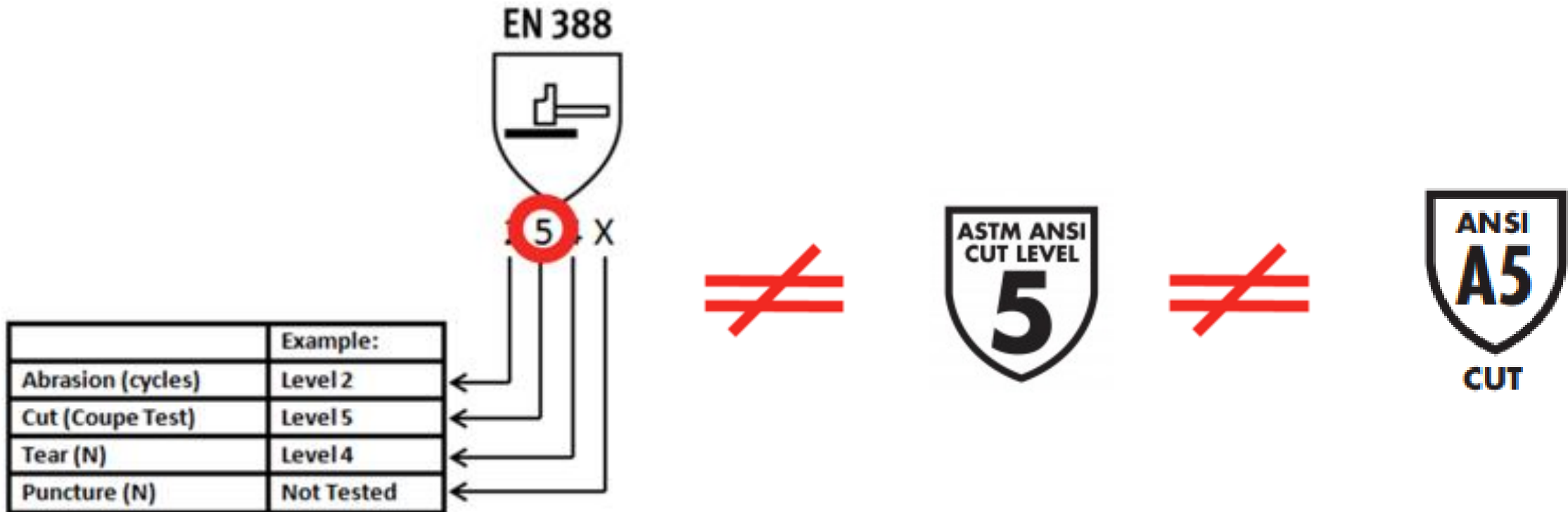
Is there a separate standard for sleeves / arm protection?

- Currently there is no separate standard for sleeves or arm protection
- The ANSI/ISEA 105 Hand Protection Committee is considering including sleeves in their next revision



Typical Questions Asked

How do I convert EN to ANSI?

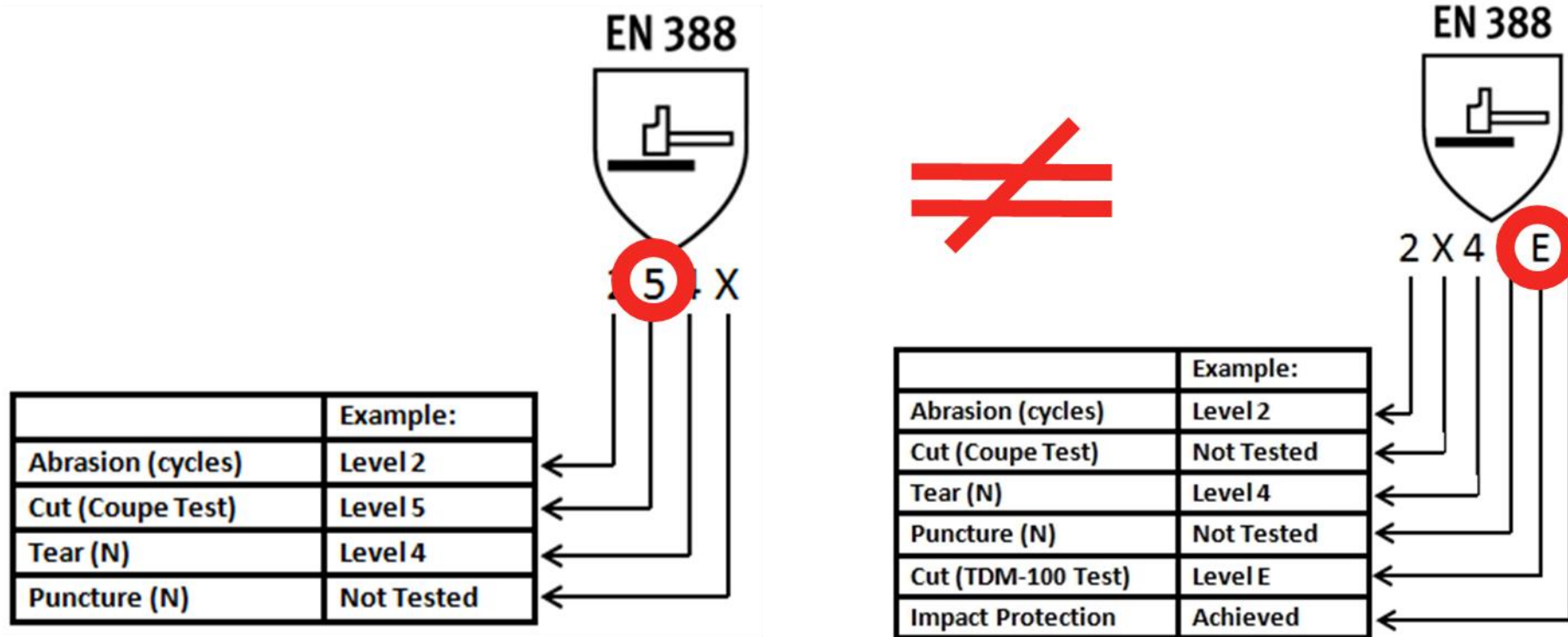


There is NO CORRELATION between Old EN and ANSI



Typical Questions Asked

How do I convert old EN to new EN?



There is NO CORRELATION between Old EN and New EN

Typical Questions Asked

Can I convert New EN to ANSI?

**It's best to let the
glove manufacturers
do it for you!**

#378GKGV B
ENDURA®
IMPACT-RESISTANT
OILBLOC™ GOATSKIN
KEVLAR®-LINED
DRIVER GLOVES

ANSI / ISEA 138 2
ANSI A5 CUT
ANSI 5 PUNCTURE
EN388 4
CE
ABRATING 36 mil/1.4mm 3

AVAILABLE SIZES

XS S M L XL 2XL 3XL



Workplace Burns

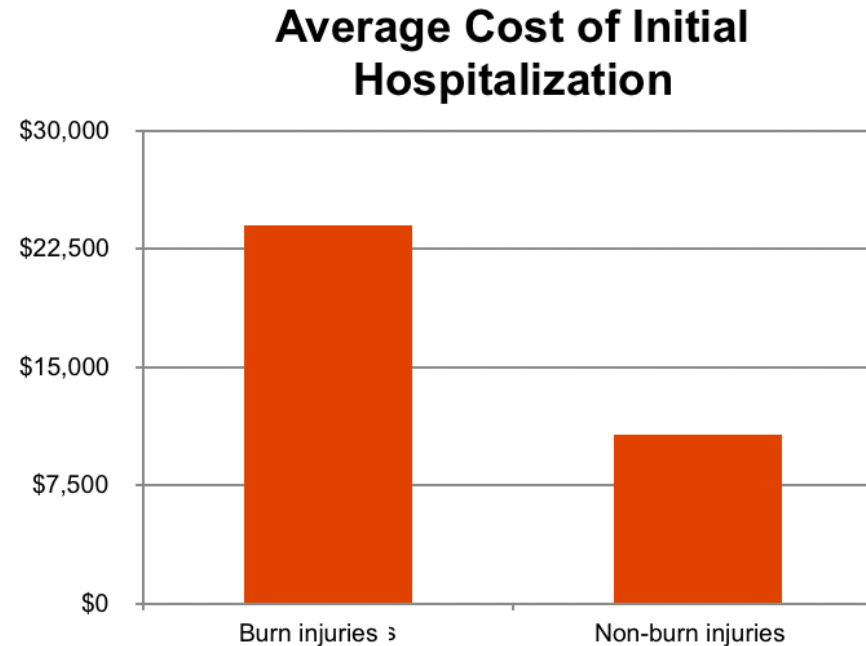
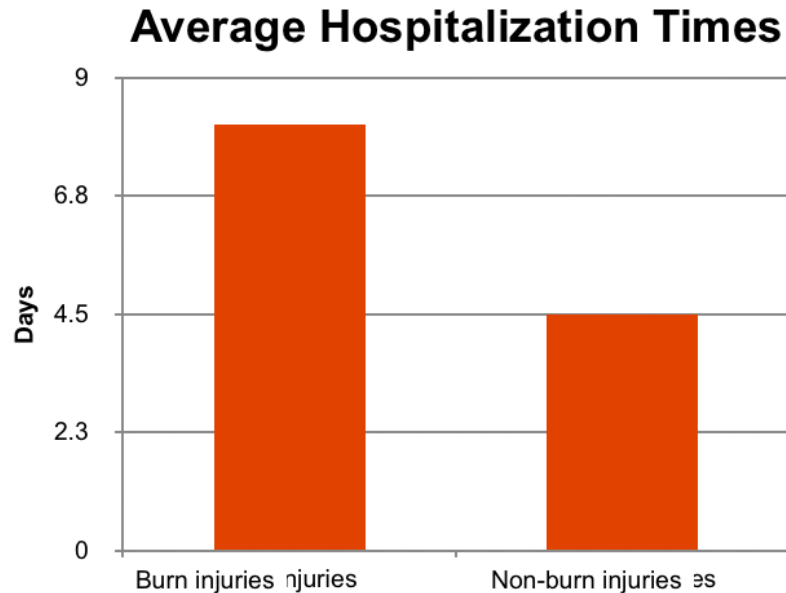


Workplace Burn Sources



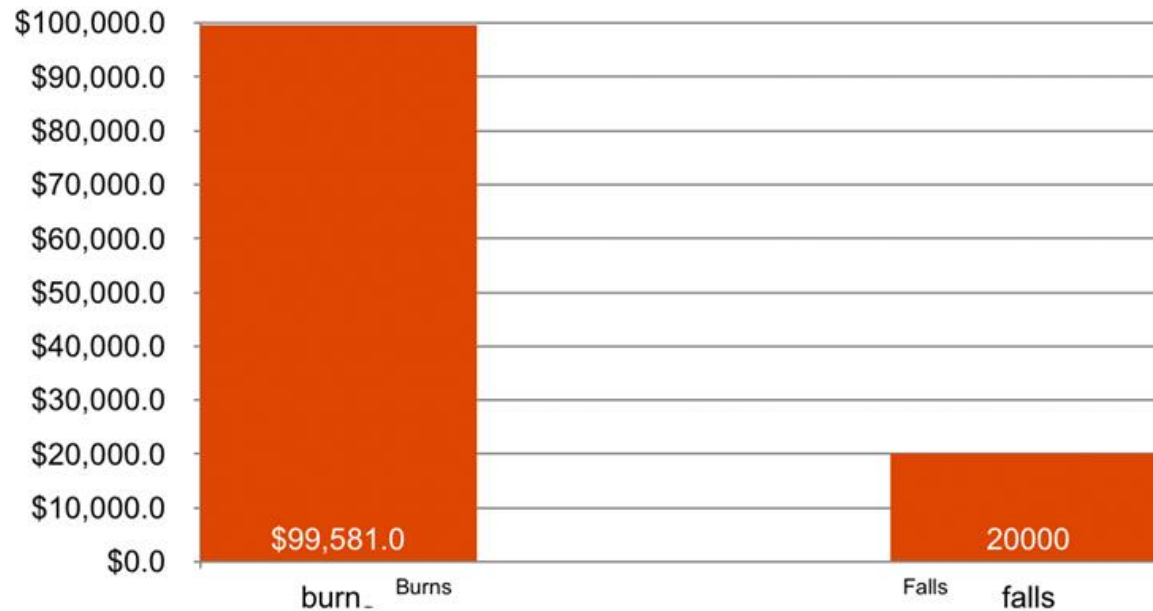
Are Burn Injuries Really a Problem?

Burn injuries account for only 1% of all U.S. injuries and 5% of all workplace injuries, but require almost twice as long initial hospital stays at more than twice the cost of non-burn injuries.



Are Burn Injuries Really a Problem?

The average medical cost of a single burn injury is 5X greater than the cost of a fall!

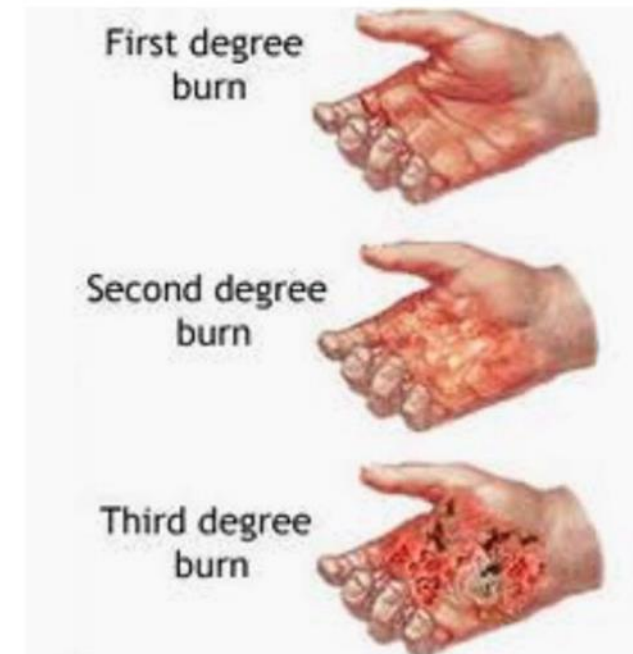


Falls are the #1 source of workplace accidents.

Burn Levels and Their Effects

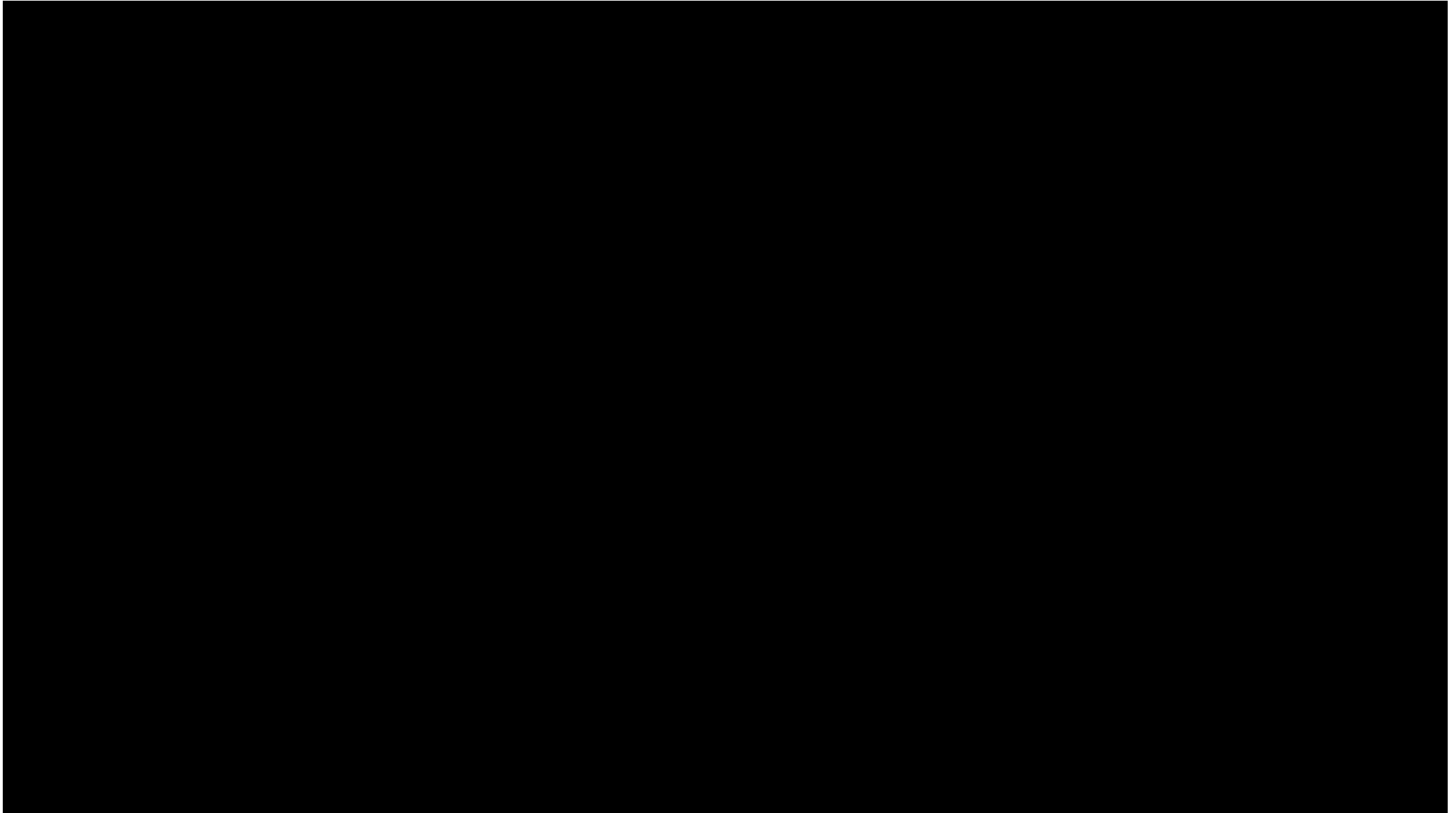
NOTE: 1st and 2nd degree burns are OSHA recordable if treated with prescription creams or antibiotics, result in restricted work, job transfer, or days away from work. 3rd degree burns are always a recordable injury.

1st degree	Can be treated with over-the-counter medications, typically require no doctor's visit and heal in 7-10 days with no permanent effects.
2nd degree	May require doctor's visit, take at least 3 weeks to heal, and patient must take steps to avoid infection.
3rd degree	Very painful, almost always require hospitalization, skin grafts and long-term treatment, resulting in permanent disability and disfigurement.

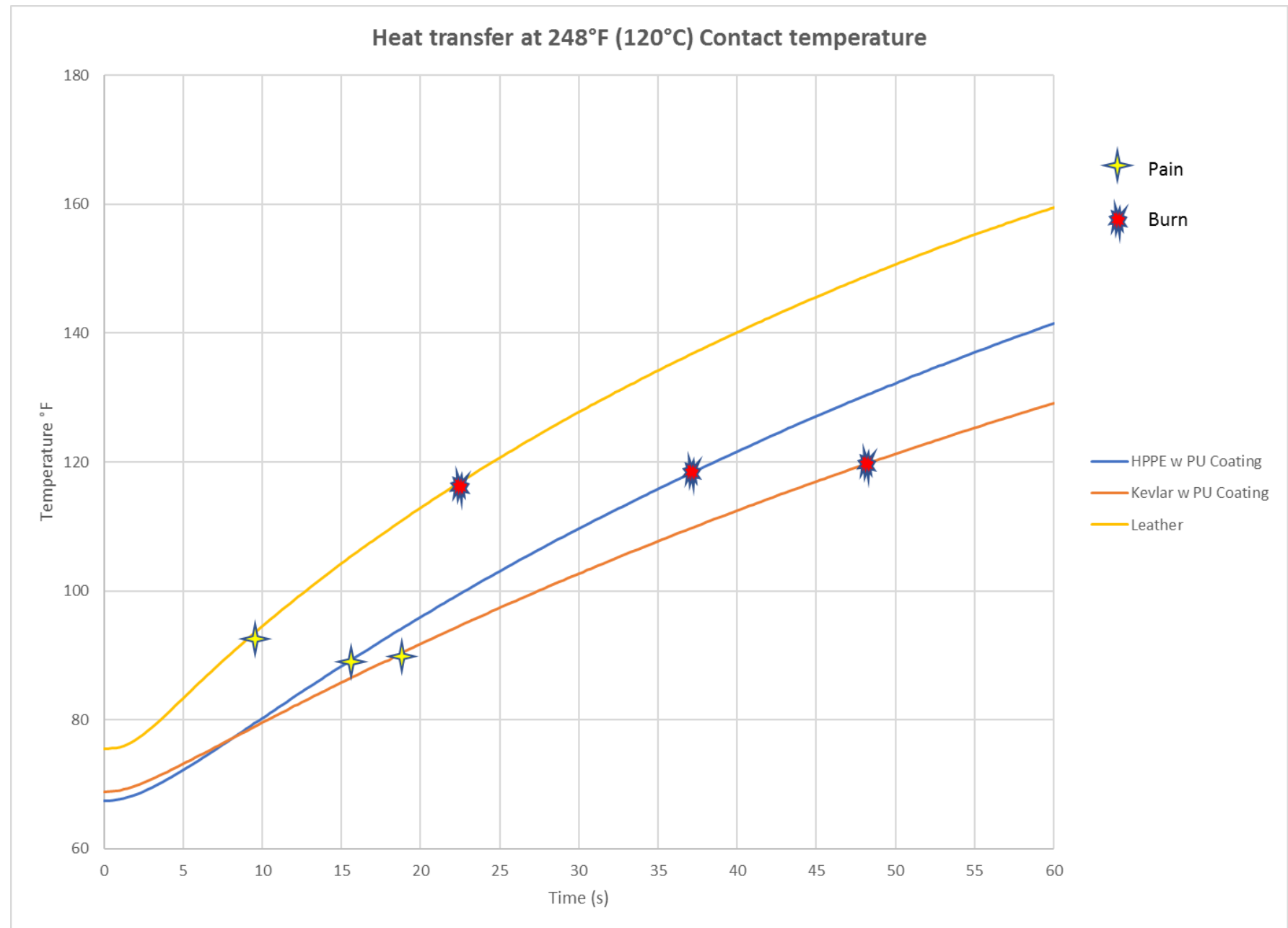


Source: U.S. National Library of Medicine, NIH, 2011 and 2013

Hot contact demonstration unit



Hot surface contact



Thermal: NFPA 2112 Inclusion of Gloves



Thermal Performance for Hand Protection

NFPA 2112-2018

Standard on Flame-Resistant Clothing for Protection of Industrial Personnel Against Short-Duration Thermal Exposures from Fire

- Heat Transfer Protective Performance (HTP)
- Flame Resistance (Right-Angle Test)
- Heat and Thermal Shrinkage Resistance Test (Oven Test)

If your body is wearing NFPA 2112 compliant clothing, shouldn't your hands be wearing it as well?

ANSI/ISEA 105-16

Not Intended for Gloves Whose Main Purpose is Flame Resistance

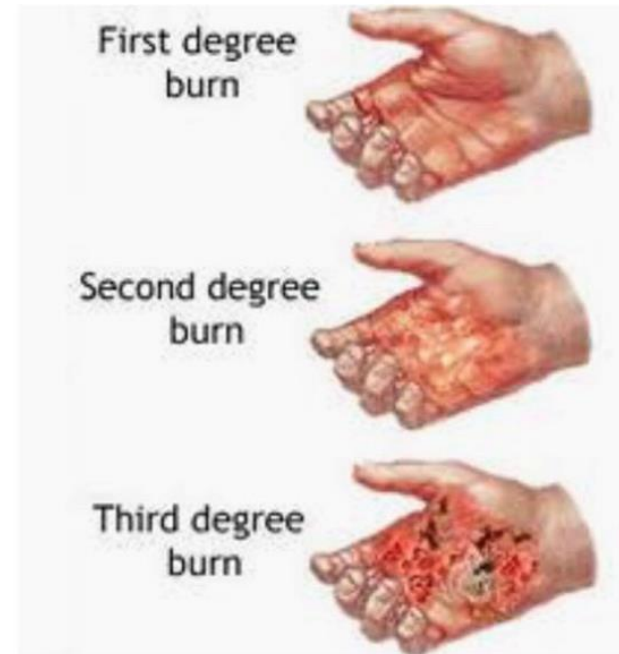
- Conductive Heat Resistance - Hot Surface Contact (ASTM F1060)
- Heat Degradation Resistance (ISO 17493:2000)
- Ignition and Burning (ASTM F1358)



Heat Transfer Protective Performance (HTP)

The test is meant to simulate exposure to continuous and combined convective and radiant thermal hazards

- Once sufficient heat has passed through the fabric to cause 2nd degree burn, the flame exposure is terminated.
- The HTP value is the product of the heat flux multiplied by exposure time estimated to result in a 2nd degree burn. The greater the value, the more protective the garment.



Flame Resistance (Right-Angle Test)

- The entire glove composite is tested, with layers in their final order as sold
- Flame is applied for 12 seconds
- Specimen can't have a char length of more than 100 mm (4 in.)
- Specimen can't have an average after-flame of more than 2 seconds
- Specimen can't melt or drip
- Not more than 5.0% of the specimen's original weight should be consumed

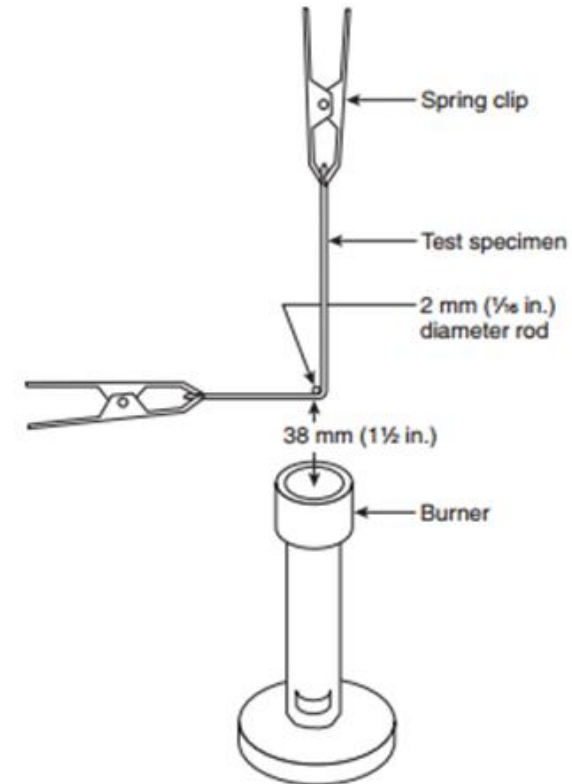


FIGURE 8.8.4.3 Specimen Support Assembly.

The Oven Test (Heat and Thermal Shrinkage Resistance Test)

- Materials are exposed in a hot air circulating oven at 260C for 5 minutes (the picture on the right is 90C for 5 minutes)
- A complete glove is tested (not individual components)
- Gloves are filled with an amount of glass beads, including in the fingers
- Less than 10% shrinkage in either direction required
- Gloves should not melt and drip, separation, or ignite
- All hardware must remain functional

Before 90C for 5 minutes



After 90C for 5 minutes



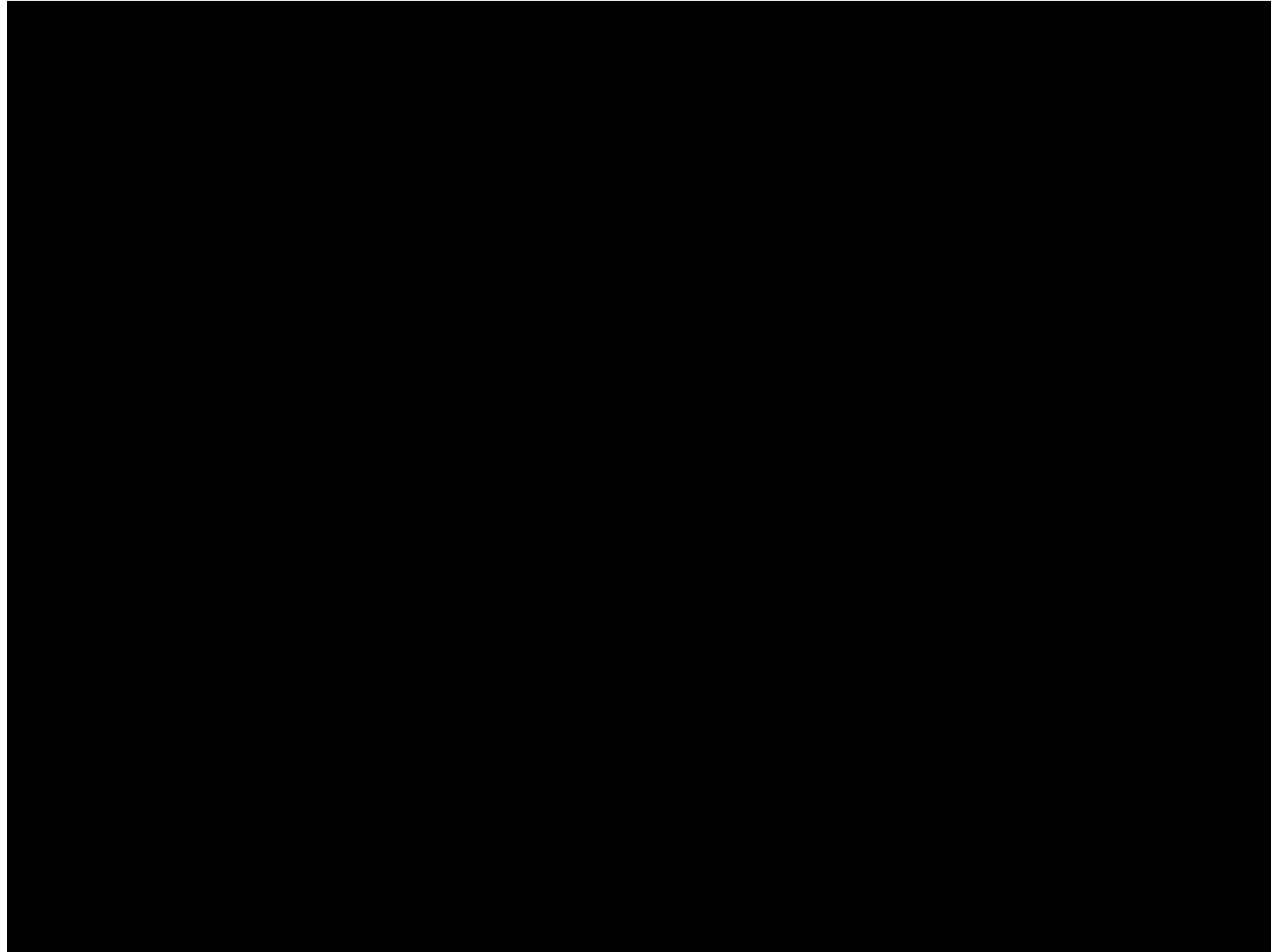
I thought you said this standard had something to do with short duration fires?

Manikin Flash Fire Test

- Gloves are not yet included in the flash fire test
- Current manikins do not have sensors in the hand
- The goal is to develop hands with sensors to include in a future revision
- The standard is 2 cal/cm² exposure for 3 seconds
- DuPont conducted the test to 4 seconds



Manikin Flash Fire Test



Glove Tests Included in NFPA 2112-2018

Heat Transfer Protective Performance (HTP)

- Based on ASTM F2700
- Materials are exposed to a 2 cal/second flame
- Evaluating the heat necessary to cause a 2nd degree burn
- As with garments, the higher the number the more protective the glove

Flame Resistance (Right-Angle Test)

- Have a char length of not more than 100 mm (4 in.)
- Have an average afterflame of not more than 2 seconds
- **No Melt, No Drip**
- Not exceed 5.0% of the specimen's original weight in consumed material

Heat and Thermal Shrinkage Resistance Test (Oven Test)

- Materials exposed in a hot air circulating oven at 260C
- Less than 10% shrinkage in either direction
- **No Melt, No Drip**
- No separation or ignition
- Have all hardware remain functional



Summary & Questions



Summary & Questions

- Burn injuries are not the most common workplace injury, but they are one of the most costly
- NFPA test methods are more stringent than the correlating ISEA 105 test methods (they target different industries and users)
- Full understanding of the true hazard is imperative
- Proper worker PPE (Personal Protective Equipment) must match recognized hazards – *If your body is wearing flame-resistant clothing, shouldn't your hands be wearing it as well?*
- Gloves made with HPPE are not appropriate materials where high heat and/or flame resistance is required
- Kevlar® is an inherently flame-resistant fiber that does not melt or drip
- DuPont Safety & Construction can help to assess your PPE needs





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