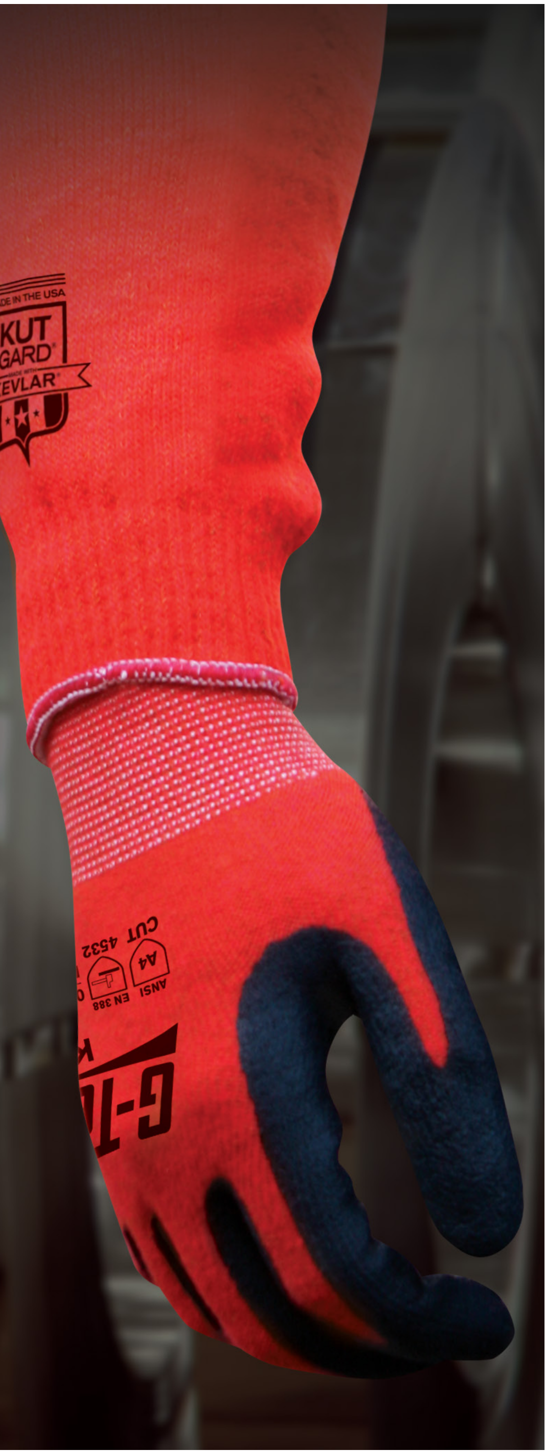
TECH BLOG 5-11-21



HANDLING HOT PARTS

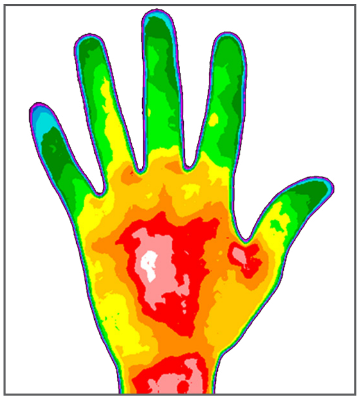
Anthony Di Giovanni,
Vice President of Global Marketing

Customers often ask us, “What do you mean by ‘light heat resistance’ with these gloves (or sleeves)?” Whether consciously or not – they are looking for some sort of assurance that they have the right glove to prevent them from getting burned when lifting or handling a certain part or object. Answering this is not simple because there are a variety of factors that affect heat transfer:

1. Glove thickness/loftiness
2. Yarn blend — Is it all aramid or is there some glass or a steel core?
3. Coating material
4. Coating thickness
5. How hot is the part or object being handled?
6. How long does it need to be handled?
7. How much time is there between the handling of hot parts?

BURN RISK

Coming back to the risk of burn: Burns take into consideration three factors – length of exposure time, heat type and temperature. For the purposes of this explanation, we will assume that most exposure with gloves will be conductive – that is where the glove makes direct contact with the hot part. (Other types of heat energy are radiant and convective. That is a possible hazard, but we will not cover these in this blog.) So, we’ve now established that we are endeavoring to recommend the right product for handling a hot part. What’s next?



TEMPERATURE

All hot parts are not the same temperature, are not handled for the same amount of time and are not of the same weight. For human skin, we need to be aware of three threshold temperatures:

90˚F / 32˚C — Feel Pain

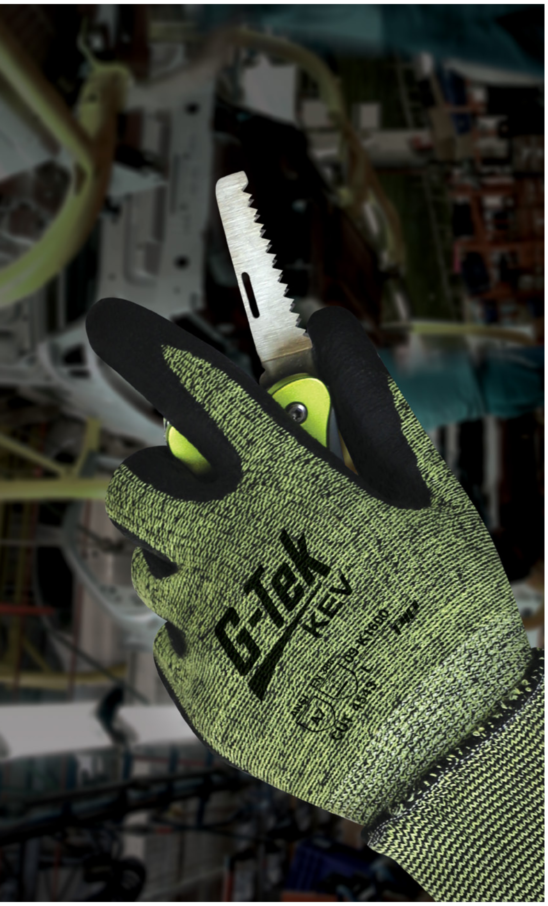
120˚F / 49˚C — Second Degree Burn

135˚F / 57˚C — Third Degree Burn

These temperatures are of course theoretical. A calloused palm touching a hot surface will likely feel pain at a different time than someone with baby-like palms. Still, we will assume the threshold temperatures are accurate for most. Putting a glove or a sleeve between the hot surface and the skin will provide added protection. It will take more contact time before the skin feels the first threshold temperature of 90°F, which equals pain. In essence, that is the desired effect of putting on a glove when handling a hot item or part.

WHAT ELSE?

There's a more subtle issue as highlighted in point number seven above that pertains to heat retention by the glove. Consider handling a hot item on an assembly line operation – gloves will end up retaining some of the heat. If enough time has not been given to dissipate some of the heat that's been transferred to the glove, the amount of time available to safely handle the next item decreases. Depending on the weight of the item and its temperature, this can represent a significant reduction of productivity AND risk. For example, a piece of tin foil at 700°F does not have the weight and mass to transfer much heat, so it's likely that a 12oz cotton glove can perform that task repeatedly all day with a mere few seconds of handling. In contrast to this would be a part that weighs 5lbs and is at 200°F. The expected level of heat transference and retention would be higher, and it would take significantly more time for the glove to cool. To counter this effect, a heavier gauge of glove would be recommended. There are other factors as we mentioned in points one through four above. We need to be conscious of the fact that blended yarns of aramid with a steel core will not be as effective as lofty yellow aramid gloves. Coating is another factor – a thicker coating will provide more resistance. The final point relates to weight: A heavy hot part pressing down on the glove will compromise the amount of time it takes to feel pain.



IS ARAMID REALLY THE ANSWER OVER HPPE IN ALL HEAT APPLICATIONS?

Recently we had the opportunity to witness an interesting demonstration on heat transfer. Two coated seamless knit gloves (one with HPPE fiber and one with aramid fiber) were placed side-by-side on fixed hand forms and pressed downward to cup (contact) a heated tube at a 212°F with the same force pressure. This setup simulated a hand touching a hot steam pipe in a plant. Hand forms were equipped with sensors on the surface of the hand to measure temperature. As the contact time with the tube passed, we could observe the three temperatures of the sensors inside on a screen as heat transferred through the glove. Click here to see video of the demonstration.

From this demonstration, we can conclude that gloves with aramid fibers definitely resist heat conduction better than HPPE. This is a fact. However, the demonstration did not account for varying pressure applied or different coatings that we find on gloves. We can conclude that aramid blended gloves or sleeves offer better heat resistance when handling hot items for a short amount of contact time. As previously outlined, a glove's fiber makeup will directly affect heat conduction, but it is the nature of the application that will ultimately drive the decision. HPPE is still a viable solution, for individuals handling hot parts for a short amount of time, but for longer contact times such as visual inspection of hot parts for defects - aramid would be the better choice . It is of importance that we impart this knowledge to you, our customers – but at the same time stipulate that this Tech Blog and the experiment was only a demonstration. The only real test of performance is one that is done in the actual job setting and with the real tasks.

**Aramid is the generic name for Kevlar® or Twaron fiber*

View our complete line of heat-resistant gloves