

Personnel protection isn't as standard as you think

Mascoat

For many years, plants and facilities have been insulating substrates and equipment for personnel protection (PP) against burns. However, an unfortunate, unintended consequence of using conventional insulation for PP is Corrosion Under Insulation (CUI), a very expensive issue that must be addressed. Some stopped using conventional insulation because of CUI and created expanded metal guards to reduce costs, but this led to workers cutting themselves on the sharp edges. Protection from burns had become exceedingly difficult to achieve without major issues. In recent years however, there have been alternative innovative solutions to these common problems.

About 10 years ago, thermal insulating coatings (TIC) became commercially viable and offered a practical solution to PP without the cut and corrosion risks. Anyone who has placed their hand on a TIC covering a hot substrate knows even with a minimal amount of coating, the surface is easily touchable without fear of burns.

The main hurdle for TIC's rapid growth regarding PP has been to fit within acceptable criteria for preventing burns. The common

belief of that criteria is what can be referenced as the "5-second rule" or the "less than 140 F rule," which is measured with standard temperature devices, such as infrared guns or thermal probes. The genesis for this rule is commonly pointed to OSHA, however no one really has a hard definition of what it states. While those are good baselines to follow, they are misleading; heat flux is what burns a person, not temperature.

Heat flux is the most important factor to consider in PP. It is defined as the rate of energy (heat) transfer through any given surface. Imagine an iron skillet at 140 F and a piece of cloth at 140 F. Both have different heat flux values, therefore they absorb and transfer heat at different rates. For example, commercial towel warmers for restaurants and barbershops usually keep their contents at 160-170 F, but the towels won't cause severe burns when you touch them. Now, try touching your hands to the iron skillet at 160 F for just a second and it will result in a serious burn.

Using their knowledge of heat flux, George More, president of Mascoat, and Howard Mitschke, a retired coatings spe-

cialist with Shell Global, both examined the rules and regulations concerning PP. Their research found ASTM had written documents (as early as the 1960s) about burn protection and defined rules as well as testing standards.

These documents confirmed a burn risk was anything that causes permanent skin damage after a 5-second exposure to a steady temperature of 138 F (58 C); however, because different surfaces have different rates of heat flux (energy transfer), it takes a different amount of time for each type of surface to reach a constant 138 F. The ASTM devised a tool to define the heat flux of a given surface by measuring the energy transfer through a silicone pad (to mimic skin) in time increments to judge how long it would take a surface to reach that temperature.

Using the information in the ASTM documents, More and Mitschke worked on a study with a third-party lab using Mascoat's insulation coating, Industrial-DTI (DTI), to see how the product performed in regards to PP. The concept was to create worst-case testing scenarios using DTI at varying thicknesses on carbon steel

substrates at different temperatures. The goal was to have reproducible data measured with the ASTM tool, so an overall analysis could be examined without bias. The results were overwhelmingly positive

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and clearly identified that even at minimal thickness of 40 mils (1 mm), the coating was well within the ASTM criteria for 5-second skin exposure, even up to 400 F (204 C). Safeguarding employees is of the utmost importance in any workplace environment. This study will now give plant and facility managers/HSE tangible reference to guidelines and use of insulating coatings technology to help keep their staff safe.

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