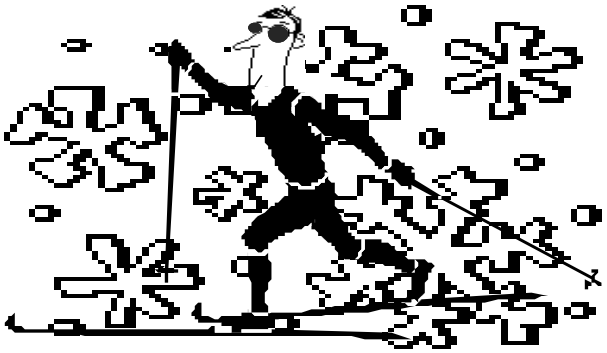
"HAPPY NEW YEAR 2012"

from Met-L-Chek® and the Penetrant Professor



How Small A Crack Can Be Found?

This question arises from time to time, and it recently resurfaced. A test lab had examined a part that had failed for a customer. The customer's buyer then requested an explanation of the test process that included definitions of the sensitivity levels of penetrant available, and the sizes of cracks that can be found. In turn, the test lab passed the questions on to us. While answering these questions is easy and old hat to those of us who understand what penetrant inspection is about and how it works, addressing answers to lay people becomes difficult because they are often starting from ground zero.

Our answer in these cases is usually to refer the questioner to the applicable specifications, in this case, **SAE AMS 2644** and **ASTM E-1417**. A review of these, if read seriously, will usually satisfy most of the curiosity involved. However, they will not answer the vexing question of what size cracks can be found. First, the answer is not simply dependent upon which sensitivity penetrant is used, but mostly upon the skill of the inspector.

Further, the answer can be different if the inspection is carried out by a skilled inspector in laboratory conditions in contrast to a less skilled inspector operating on a production line. These factors are taken into account by the quality engineers who understand the type and sizes of the flaws that are being sought, and the combination of the penetrant sensitivity level and inspector skill levels that will be involved. With these facts, the inspection process is developed and a specification specific to the situation at hand is developed, tested, and put into place. This is far different than asking simply what size flaws can be found, a question that we sometimes liken to asking **"how long is a piece of string??**

2012

Hydrophilic Emulsifier Concentration

We also seem to get fairly regular calls about the concentration of hydrophilic emulsifier. This emulsifier is qualified with post emulsifiable penetrants at a specific concentration that is the listed in the QPL. For Met-L-Chek E-58D, the concentration is 20% by volume in water, or one part E-58D plus four parts of water. Using the emulsifier at a lower concentration makes it less aggressive and one can expect that the process sensitivity will increase, but so will the fluorescent background. Company specifications usually take this into account, and Pratt & Whitney, for example, specify in their operating procedures that the concentration must be between 17% and 20%. The ASTM E-1417 requirements are slightly different, as follows:

"For immersion applications, the concentration, as percent of volume, shall be no higher than that specified by the penetrant system supplier and shall not exceed that for which the system was qualified. For spray applications, the concentration shall not exceed 5 %."

Met-L-Chek Company, 1639 Euclid Street, Santa Monica, California, 90404, U.S.A.
Phone: 310- 450-1111 Fax 310-452-4046 Email: info@mat-l-chek.com Web: www.met-l-chek.com

This wording allows the penetrant user to develop concentrations that achieve what is required for their particular inspection, provided, of course, that the concentration does not exceed that which is listed on the QPL for immersion applications or 5 % for spray applications.

January ASTM Committee E-07 Meeting

Here we are in 2012, and that means that the first meeting of ASTM Committee E-07 will take place in Plantation Florida during the week of January 27th. Most of the work of the committee regarding penetrants has been finished, but an interesting aspect has emerged and will be discussed. To understand it, one must go back in history to the "olden days". It was recognized very early on that the brightness of fluorescent penetrant indications was directly related to the intensity of the UV-A irradiation. At that time, the specifications were written to assure that the irradiation level was sufficiently high enough to insure good inspection. The result was the now familiar requirement that the intensity be 1000 microwatts per square centimeter at a distance of 15 inches. Well, guess what? One can now easily obtain new LED UV-A lights that have intensities that are much higher than this. We also know that fluorescent penetrant indications can fade due to high UV-A exposure. Understanding this raises the question of whether there should be an upper limit to the intensity of the UV-A lights used for inspection. This subject will be up for discussion at the meeting with the idea that the relevant specifications might include some upper limit. In addition to this subject, the new effort to discuss the various newly available UV-A sources will take place. There will be discussions of intensity, wave length, white light emission, etc., led by John Brausch, of the U. S. Air Force Materials Laboratory.

PENETRANT
PROFESSOR
is an occasional
publication
of
Met-L-Chek®.
To receive it,
call or Email
Beverly Clarke.
310-450-1111
info@met-l-chek.com

More About UV-A Lights

With the present availability of different UV-A sources, interest has arisen that focuses on questions of wave length, intensity, and white light emissions from these sources. A recent offering from **Spectronics** was developed as a result of some of these considerations. This offering is advertised to have a diffusing filter that does two things. First, it limits the white light emissions to less than two foot candles, and second, it limits the UV-A output to a maximum of 5000 microwatts per square centimeter at 15 inches. This light was developed to meet ISO specifications, but at the same time, it seems to anticipate some of what may emerge as new **ASTM** specifications concerning UV-A sources. Recent ASTM meetings have had discussions concerning white light, the potential for UV-A fading of penetrant indications, and reflected haze that interferes with clearly seeing the indications. Work by **CASR** at Iowa State showed clearly that indications are susceptible to fading under high intensities of UV-A. With new LED sources, extremely high intensities are available and no present **ASTM** procedures address this and the possibility that they might cause indication fading. This offering by **Spectronics** addresses the questions of high UV-A intensity and white light levels that could be undesirable in the inspection booth.

Tank Integrity

This was a new one for us, but then, new ones arrive rather often. A customer had been hydrostatically testing tanks to determine if they were leak tight. To do this, they filled the tank with water, then applied D-70 aerosol developer to the exterior wherever there was a welded seam. If there was a leak, the D-70 coating became wet. Their use of this technique was stopped because their environmental or safety department objected to the flammable nature of the developer, and we were initially asked if we had a water based developer that they could substitute for the aerosol developer. Instead, we introduced them to our WLF-71, which is a water soluble fluorescent dye that is added to the hydrostatic test water. If there is a leak, it is easily found by simply examining the welds with a suitable black light, since the water leaking from the flaw will fluoresce.

The Penetrant
Professor