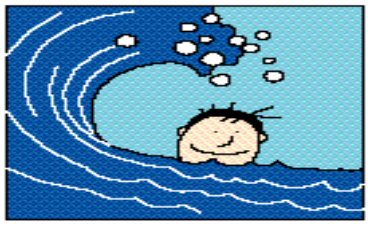
The Summertime Penetrant Professor from Met-L-Chek®

"Vacation on"!

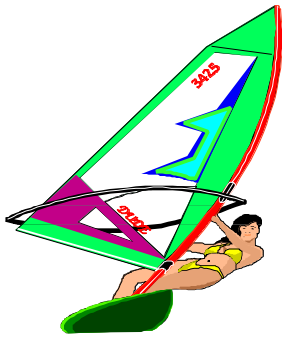
WATER CONTENT

We are getting phone calls asking why we do not use ASTM D 95 to measure the water content of penetrants and emulsifiers. ASTM E 1417 & NADCAP PRI AC7114/1 revision A, allow the use of ASTM D 95 or the modified Karl Fischer method. This latter method was introduced to ASTM E 1417 some years ago by **Met-L-Chek®**. The reasons for this are simple.

ASTM D 95 requires the use of Xylene and boiling it in a special apparatus. The method is not particularly safe, takes more time than the Karl Fischer method, is more expensive to perform, and is not as accurate. But a second reason is that the ASTM D 95 method cannot measure the water content in formulations that contain azeotropes, and there are formulations that do include these. Consequently, if you are using a penetrant product that contains an azeotrope, the ASTM D 95 method will report that the product is 100% water, something that will immediately be obvious as false.



Any specification that only lists ASTM D 95 as the acceptable method for measuring water content is probably out of date, since the Karl Fischer method has been included in ASTM E 1417 for probably about 10 years.



MIXING BATCHES

We do not know to what extent this subject is a problem for anyone in the USA, but it seems to have come up in Europe. There is a lot of common sense involved in this subject, and probably most, if not all, of our readers will agree with that. But let us take a look at the subject.

The easiest situation to look at is where one has a tank full of penetrant, and the level falls because it is being used to inspect items. The level then needs to be brought up by adding penetrant. When the replacement penetrant is ordered, it is rarely possible to get the same batch that is in the tank unless a special arrangement has been made with **Met-L-Chek®** to put a certain quantity of a specific batch into inventory, tagged for a specific customer. Otherwise, the product ordered will be of a different batch than what is in the tank. Assuming that the penetrant ordered is the same product that is in the tank, the replacement material will have been manufactured, tested, and certified to be the same as the product that is in the tank. So, mixing of different batchs is not a problem but rather common practice.

There are two situations where one might add a different product to the tank than what is in it. Both of these situations are to be avoided, but there is evidence that they have happened in the past. The first of these is when he tank contains a penetrant made by manufacturer “A”. When the tank needs to be replenished, the

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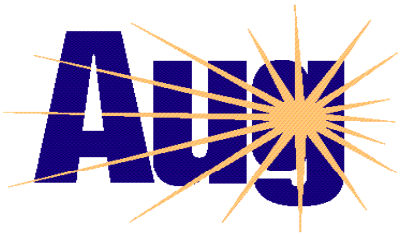


purchasing agent does not realize that the same product must be added. This agent orders a penetrant of the same type, method, and sensitivity, but made by manufacturer "B". His or her logic could be that a Type I, Method A, sensitivity level 2 penetrant is listed on the QPL as being equivalent among all qualified manufacturers, and therefore they can be mixed. While this might be an appealing bit of logic to the uninformed, those who have the responsibility for the inspection process know that this cannot be done. Different manufacturers use different formulations that result in equal performance, but they cannot be mixed, because it would result in a formulation that was not approved, and which might not work.

The second situation is where a penetrant of the correct manufacturer, correct type and method, but of a different sensitivity is added to the tank. Now one has a tank filled with a penetrant of unknown sensitivity. It is possible that the resulting penetrant could have a sensitivity somewhere between the two levels, but even if it does, the tank no longer has an approved penetrant in it.

These situations can be avoided by being careful to order the correct product, and being sure that the product is added to the correct tank. Of course, one of the reasons for performing the periodic ASTM tests on the penetrant inspection line is to detect problems of this type.

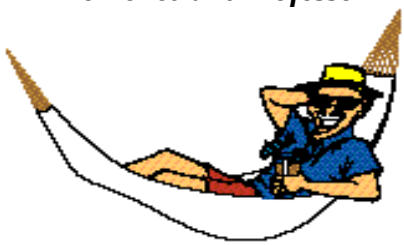
CONTAMINATION

Here again, there is a lot of common sense involved. One should simply see that junk- oops, foreign material – does not get into the penetrant. But it does happen. There is the obvious poor practice of people throwing stuff into the tank. We are told that tanks have been seen with plastic water bottles floating in them, and we know of an instance where a janitor cleaned his mops in a tank of emulsifier. Then there are those instances where the source of the contamination is much less obvious. Water can get into a tank of water washable penetrant as over spray from a poorly directed water wash nozzle. Water can also get onto a tank from condensation, a bit each day until there is enough to cause problems. The penetrant composition can change because parts are immersed in it while they are too hot, causing some of the penetrant ingredients to evaporate. Parts can be immersed that are not properly cleaned and that have contaminants on them that then are left in the penetrant.

Parts can be immersed that have acid or alkali residues on them from the cleaning operation that change the chemistry of the penetrant, including quenching the response of the dye.

Proper design and operation of the inspection system and an awareness of what is going on can minimize the possibility of these things happening. Keeping tanks covered when the inspection line is not in use is also a very good practice.

The Penetrant Professor



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