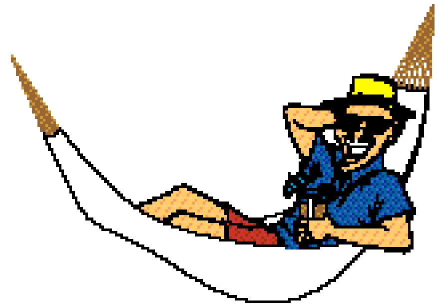
The Penetrant Professor from Met-L-Chek®



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Flag Day 14th
Fathers Day 19th

World Congress NDT, Munich, Germany June 13-17

ASTM meeting Chicago, Illinois June 27-June 29 2016

Flash Point vs Auto-Ignition Temperature

We have often looked to other NDT practitioners for input for Penetrant Professor articles. In this case we are basing the article on the newsletter put out by two knowledgeable French friends, Patrick Dubosc and Pierre Chemin.

Over the years we have heard these two physical parameters being mixed up by penetrant users. Safety Data Sheets (SDS's) are often a source for this information but like so much else on the SDS can be misinterpreted by those not fully knowledgeable on what the data means.

The flash point of a liquid is the lowest temperature at which it can vaporize to form an ignitable mixture in air. Measuring the flash point requires an ignition source. At the temperature of the flash point the vapor may cease to burn when the ignition source is removed.

The flash point should not be confused with the auto-ignition temperature, which does not require an ignition source.

The fire point, a higher temperature, is defined as the temperature at which the vapor continues to burn after being ignited. Neither the flash point nor the fire point is dependent on the temperature of the ignition source, which is much higher.

The flash point is often used as a descriptive characteristic of the liquid fuel, and it is also used to help charactering the fire hazards of liquids. "Flash point" refers to both flammable liquids and combustible liquids. There are various standards for defining each term. Liquids with a flash point less than 60.5°C (141°F) or 37.8°C (100°F) — depending upon the standard being applied — are considered flammable, while liquids with a flash point above those temperatures are considered combustible.

The auto-ignition temperature or kindling point of a substance is the lowest temperature at which it will spontaneously ignite in a normal atmosphere without an external source of ignition, such as a flame or spark. This temperature is required to supply the activation energy needed for combustion. The temperature at which a chemical will ignite decreases as the pressure increases or oxygen concentration increases. It is usually applied to a combustible fuel mixture.

Examples of some commonly used products:

Gasoline:
- flash point -43˚C(-45˚F)
- auto-ignition 246˚C(495˚F)

Acetone:
- flash point -20˚C(-4˚F)
- auto-ignition 465˚C(869˚F)

Isopropanol
- flash point 12˚C(54˚F)
- auto-ignition 425˚C(797˚F)

Typical oil-based penetrant:
- flash point 100˚C(212˚F)
- auto-ignition >200˚C(>392˚F)

Figures for flash point vary, depending on the method of flash point measurement: open cup or closed cup.

Pensky-Marten closed cup flash point tester.

Cleveland open cup flash point tester.

Without getting into technical details of why, there is often a difference of 5 to 10°C (10 to 20°F) or even of 20°C (40°F) between the figures measured with the open cup and with the closed cup. The open cup gives a higher figure, which is more likely to duplicate the real conditions of use.

In regard to PT and MT materials, the closed cup method is often used, as per the **ISO 2719** or the **ASTM D-93** standard. These methods are used in shipping and safety regulations to define flammable and combustible materials. The relevant regulation should be checked to understand the difference of classification between flammable and combustible materials.

When looking at the acetone data, for instance, one will see that its auto-ignition temperature is far higher than that of penetrants. Thus one might conclude from the data that acetone may be less dangerous to use than penetrants, in regard to fire hazards. Not the best conclusion!

Often overlooked is another hazardous condition, that of static electricity. If one wants to pour a flammable liquid, or even a product classified as combustible, from one container in another container, a **very important precaution** should be taken prior to beginning the operation. Connect the two containers with an electric wire, even for a second. By doing so, one puts the two containers at the same electric potential, and no electric discharge will occur when the liquid coming from the first container comes in contact with the second container. The static discharge is an ignition source and one is simulating an open cup flash point tester. The explosion is instantaneous, impressive, even with small quantities of solvent… and may even kill.

Dyslexia Correction

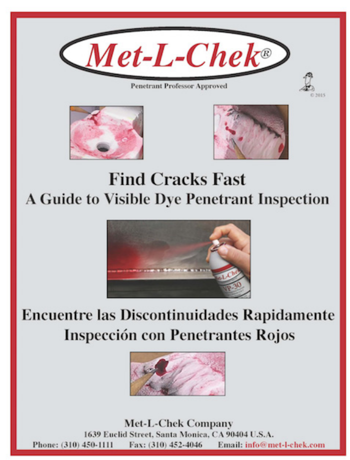
In the May 2016 issue of the Penetrant Professor the phone number for one of the distributors of the Hoffman Panel was missing a digit. KaMac - phone 1-508-347-7790

Jun 2016

On The Web

SDS's in English and Spanish are available on our web page www.met-l-chek.com. These are being updated on an on going basis as raw material suppliers update their SDS's. We plan to add French versions shortly.

Also on the web is our updated literature on Visible penetrant, Fluorescent penetrants and a new introduction to Met-L-Chek Company and penetrant inspection.



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