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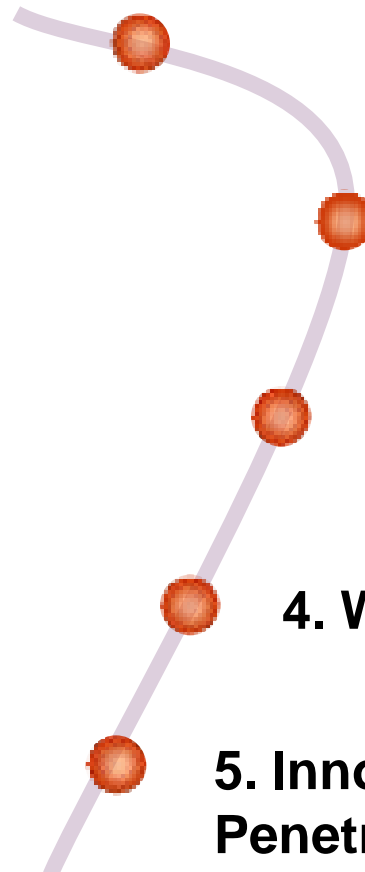
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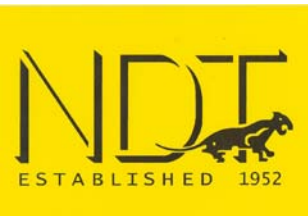
**BIG NEWS AND ATTENTION ON LIQUID
PENETRANTS, ALWAYS CONSIDERED
THE CINDERELLA OF NDT**

14 Congress AiPnD

Florence, October 26th 2011

Agenda

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- 1. New ISO 3452-5 (Liquid Penetrants “high temperatures”)**
 - 2. New ISO 3452-6 (Liquid Penetrants “low temperatures”)**
 - 3. “ETR” Liquid Penetrants (Extended Temperature Range)**
 - 4. White developers low and high temperatures**
 - 5. Innovation in Safety: Water Based Liquid Penetrants, Developers and Removers/Cleaners**



New ISO 3452-5 (LP “high temperatures”)

NDT with Liquidi Penetrants at temperatures > 50°C

Standard Conditions

- Temperature range from 10 C to 50 C (EN ISO)
- Temperature range from 40 F to 125 F (5 C and 52 C) (ASME)

New UNI EN ISO 3452-5 2009 :



UNI EN ISO 3452-5:2009

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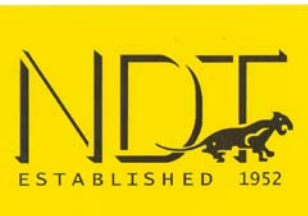
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PROCEDURE FOR QUALIFICATION

Qualification tests are performed by the manufacturer and, if the products are used within the stated range, no further tests on site are required.

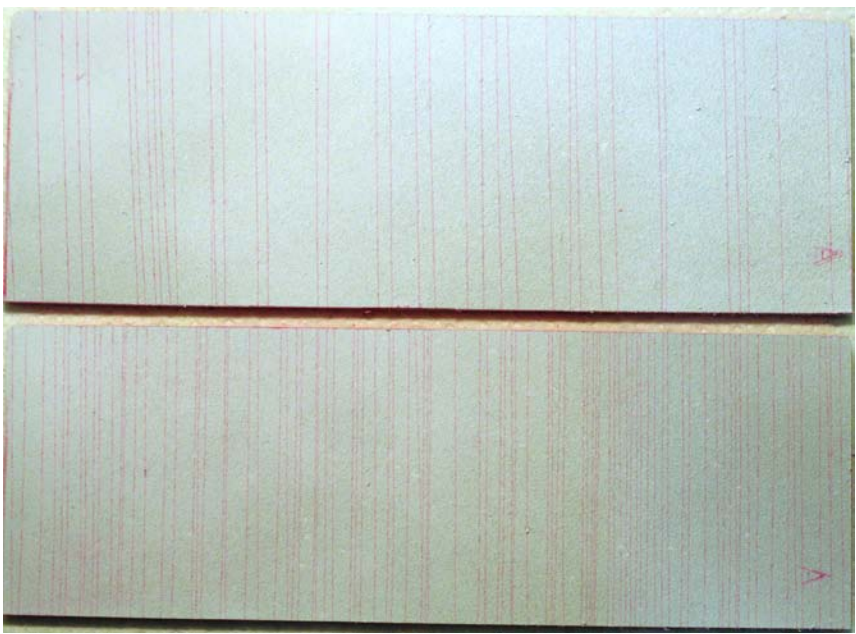


“ETR” Liquid Penetrants (Extended Temperature Range)

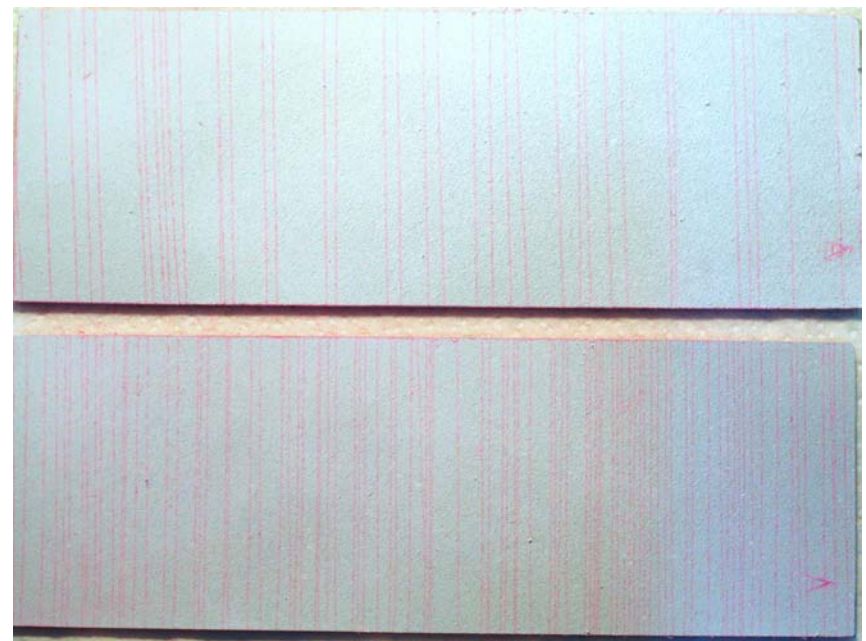
Performed Qualification Tests (Ref. Block Type 1 ISO 3452-3)

Red Liquid Penetrant Elite K71HT is qualified “ IIACcde - 2/10 C- 200 C ”

At 10 C 50 micron



At 50 C 50 micron



At 10 C 30 micron

At 50 C 30 micron

Red Liquid Penetrant High Temperatures Elite K71HT, with White Developer Elite D200 and Bio Remover/Cleaner Elite RHT are qualified sensitivity level 2 (maximum)

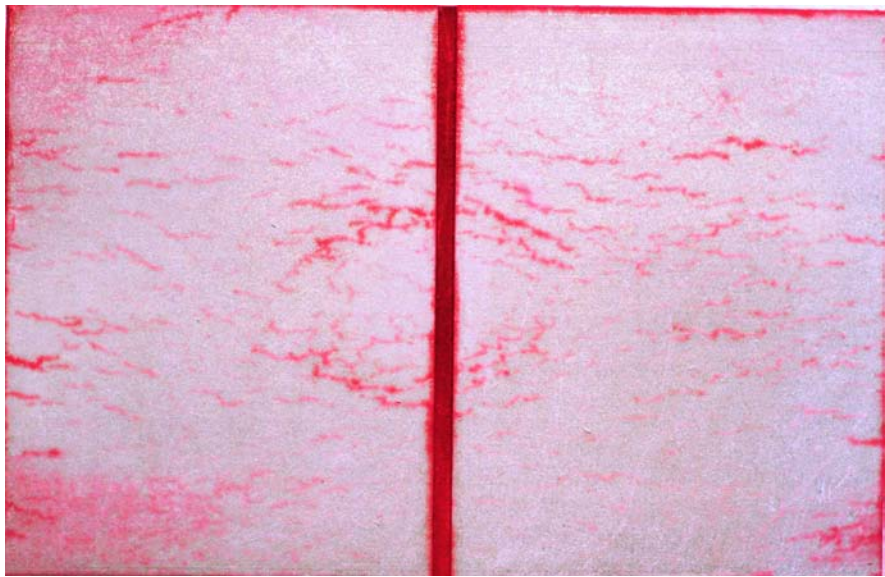


“ETR” Liquid Penetrants (Extended Temperature Range)

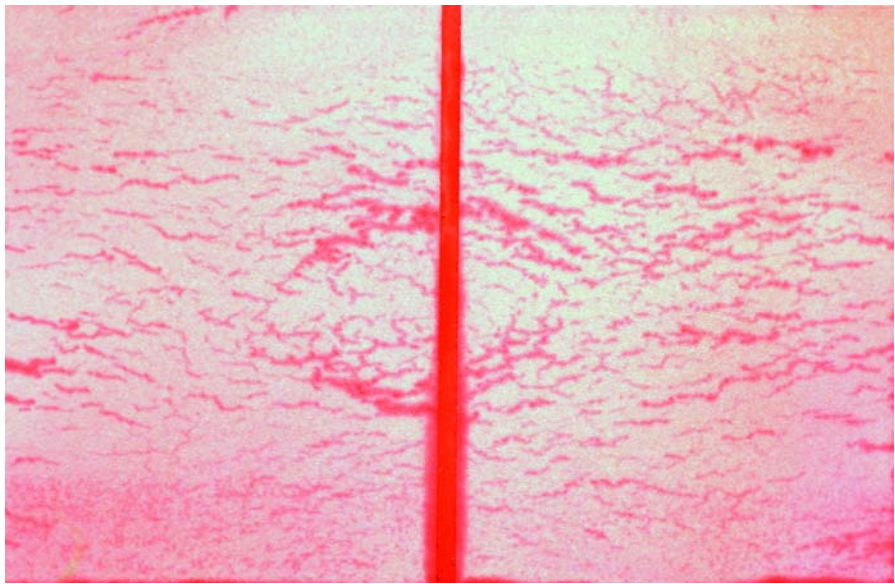
Qualitative Evaluations: The aluminum reference blocks (ASME)

Red Liquid Penetrant Elite K71HT is qualified “ IIACcde - 2/10 C- 200 C ”

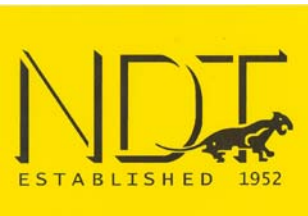
Temperature 10 C



Temperature 200 C



Red Liquid Penetrant High Temperatures Elite K71HT, with White Developer Elite D200 and Bio Remover/Cleaner Elite RHT are qualified for use from 10 to 200 C



New ISO 3452-6 (LP “low temperatures”)

NDT with Liquid Penetrant at temperatures $< 10^{\circ}\text{C}$

Standard Conditions

- Temperature range from 10 C to 50 C (EN ISO)
- Temperature range from 40 F to 125 F (5 C e 52 C) (ASME)

New UNI EN ISO 3452-6

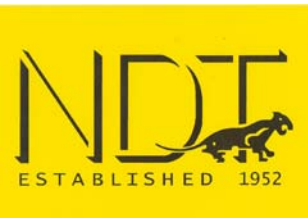
3 Low temperature penetrant testing

3.1 General principles

The general principles of ISO 3452-1 shall apply unless otherwise stated in this part of ISO 3452 or in the manufacturer's instructions.

Qualification tests are carried out by the manufacturer and if products are used within the stated range, no further tests are needed on site.



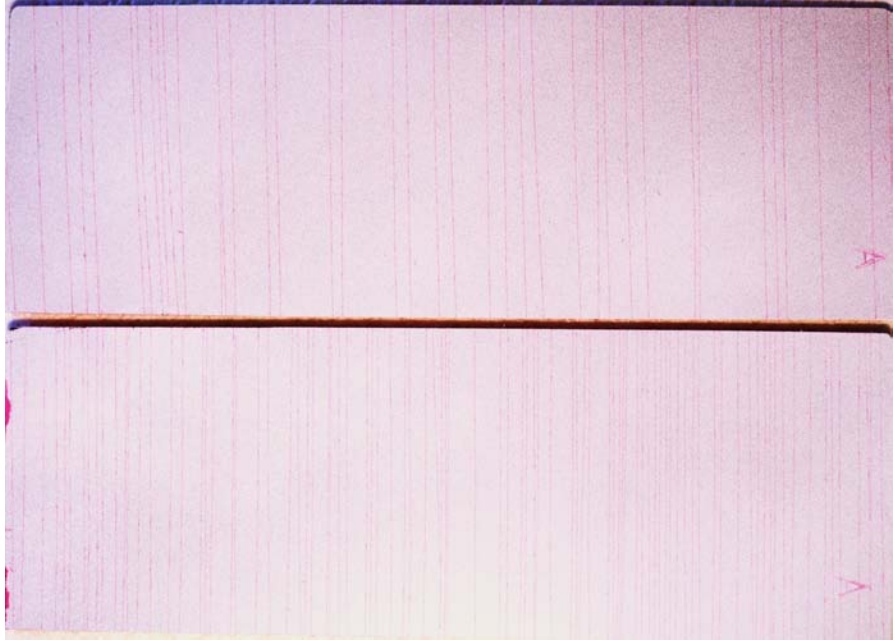


“ETR” Liquid Penetrants (Extended Temperature Range)

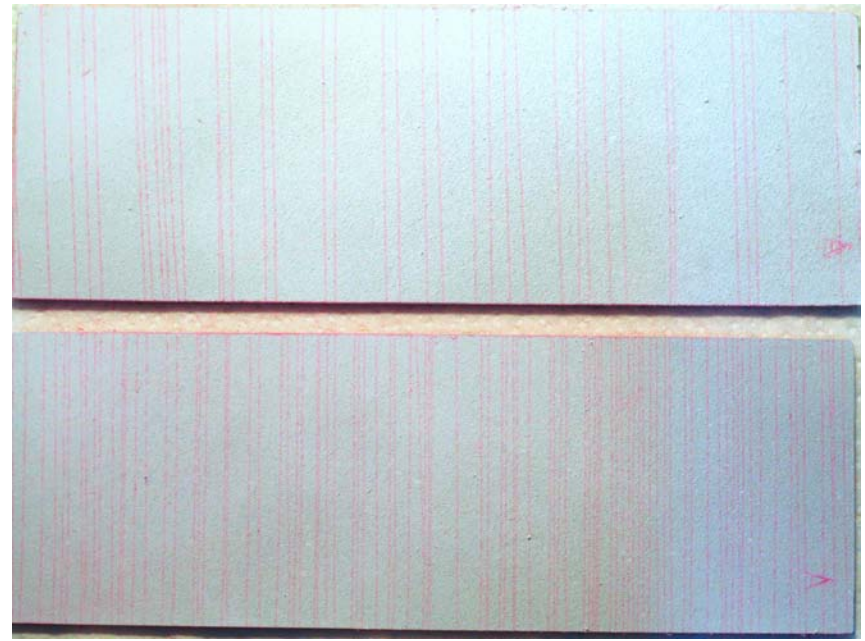
Performed Qualification Tests (Ref. Block Type 1 ISO 3452-3)

Red Liquid Penetrant Elite K71B2p is qualified “ IIACcde - 2/0 C- 100 C ”

At 0 C 50 micron



At 100 C 50 micron



At 0 C 30 micron

At 100 C 30 micron

Red Liquid Penetrant Elite K71B2p, with White Developer D112A and Bio Remover/Cleaner BC1 are qualified for use from 0 to 100 C



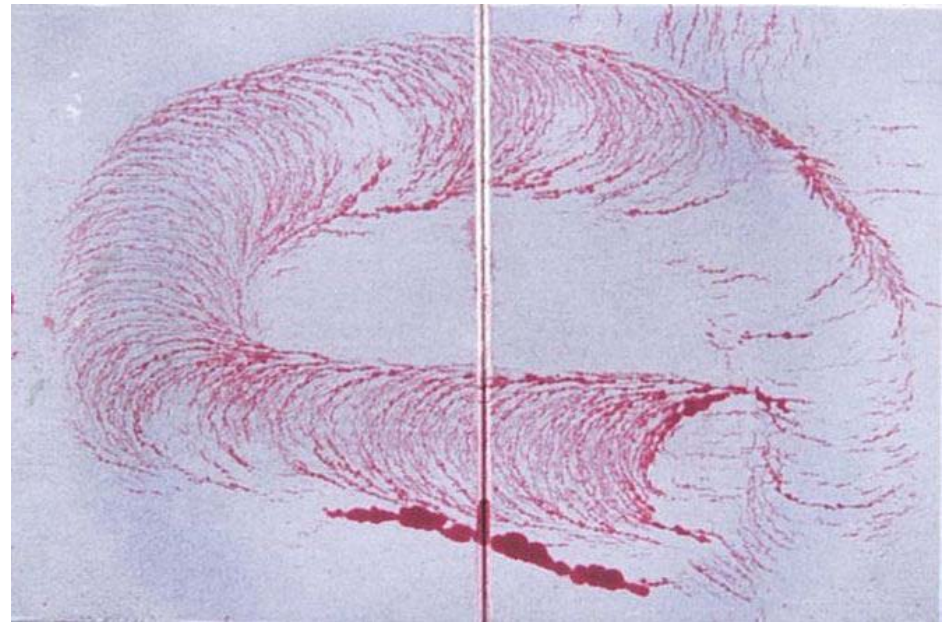
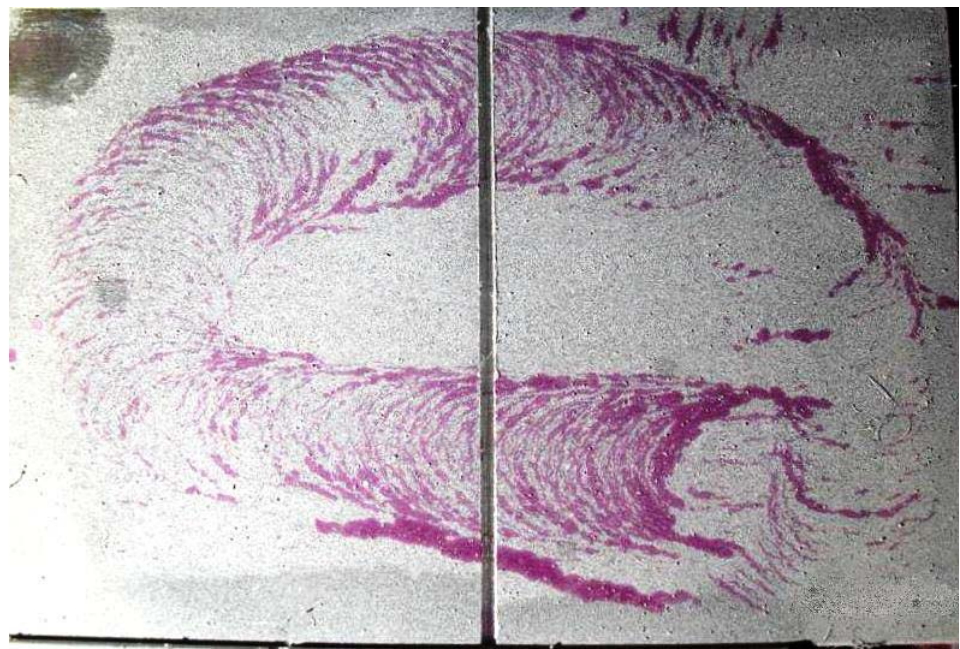
“ETR” Liquid Penetrants (Extended Temperature Range)

Qualitative Evaluations: The aluminum reference blocks (ASME)

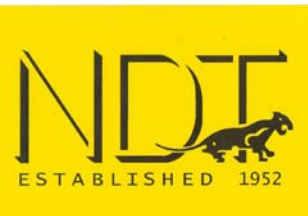
Red Liquid Penetrant Elite K71B2p is qualified “ IIACcde - 2/10 C- 100 C ”

Temperature 0 C

Standard Temperature (>10 C)



Red Liquid Penetrant Elite K71B2p, with White Developer D112A and Bio Remover/Cleaner BC1 are qualified for use from 0 to 100 C



White developers low and high temperatures

UNI EN ISO 3452-2 point 6.15; ASTM E1418 Par. 7.1.7.2

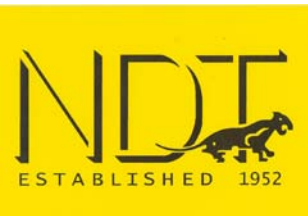
- From 0 C to 100 C:
 - Use Developers form d,e (non-aqueous solvent based type)
- From 80 C to 200 C:
 - Use Developers especially formulated for high temperatures (e.g. Elite D200) or form c developers (water-based)

UNI EN ISO 3452-2:

6.15 Developer performance

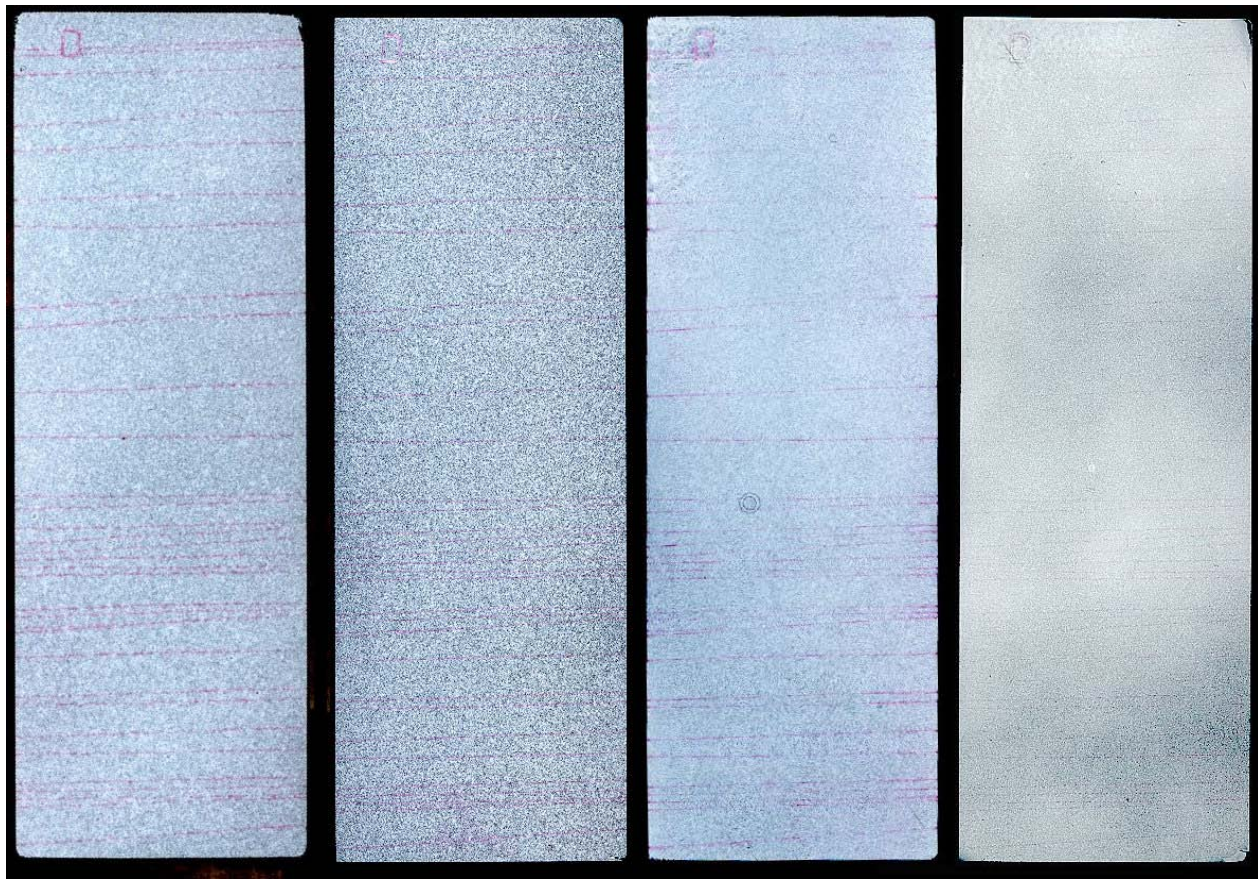
When applied according to the manufacturer's recommendations, the developer shall give a fine, even, non-reflective and non-fluorescent coating. When used in conjunction with the appropriate penetrant, the developer shall increase the visibility of the penetrant indications.



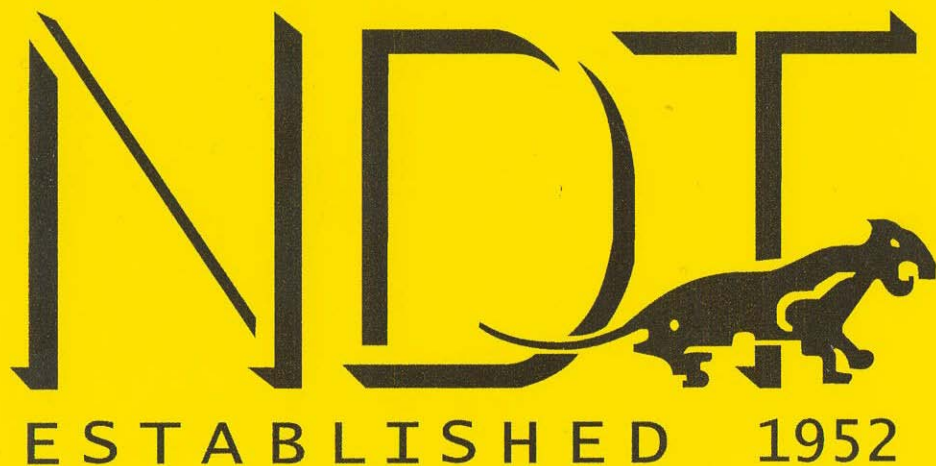


Innovation in Safety: Water-Based Liquid Penetrants, Developers and Removers/Cleaners

Performed Qualification Tests (Ref. Block Type 1 ISO 3452-3)



Red Liquid Penetrant Elite K71B2.bio, with water-based White Developer DWS2 and Non-flammable Bio Remover/Cleaner Elite20, compared to other “traditional” oil-based penetrants



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Facebook Group "NDT Italiana"

Maurizio Cevenini

Michele Cevenini

***NDT ITALIANA Proudly Supports Beat Leukemia ONLUS www.beat-leukemia.org
"The difference between difficult and impossible is that impossible takes longer.
Miracles just require faith"***

BIG NEWS AND INTEREST ON LIQUID PENETRANTS, EVER SINCE CONSIDERED A “CINDERELLA” NDT METHOD

Innovative Techniques in Non-Destructive Testing in the industrial sector

IDN Code 49

Sixty years ago my aunt Angela Cevenini, founder of NDT Italiana Company, started importing from the United States the very first liquid penetrants that were used by the Italian industrial sector.

At that time other NDT techniques, like X-rays and ultrasonics, were already kept in higher consideration, maybe because they required the use of instruments that were more difficult and dangerous to use.

Forty years ago my father joined NDT Italiana, and being a young and curious technician started looking around to understand the market trends: liquid penetrants, that 20 years after the Company's foundation still were its core business, were considered in a decreasing trend, by some even close to disappear!

When I joined NDT Italiana a few years ago I had to reconsider this forecast, given that after 60 years liquid penetrants are still our core business, a business alive and growing.

I can confirm you that liquid penetrants, probably the most economical and simple NDT method, is not a Cinderella but rather much more of a Prince amongst the NDT techniques.

This opinion is nowadays shared by many, considering that at the Moscow NDT Congress in 2010 a paper was presented by the title: “ Penetrant Testing and Year 2060” on the future of this method, by P. Dubosc e P. Chemin, very well know actors in the industry.

Recently big news have come up about liquid penetrants: their knowledge can continue to help operators and Companies to improve their performances and reduce their costs, if they decide to get out of the usual work routine and put them in practice.

About two years ago part 5 and part 6 of the famous ISO 3452 were published; the first one about liquid penetrants on “hot” parts (i.e. over 50°C), the second about liquid penetrants on “cold” parts (i.e. below 10°C).

The big news is that both these standards specifies that it is the LP producer that has to carry on the temperature qualification tests, certifying the interval in degrees in which a particular product can be used. Most importantly quoting the Standard: “If liquid penetrants are used within the temperature interval certified by the producer, no further tests are to be requested by the user on the field”

The responsibility of the tests and the relative classification and qualification of its products is then passed to the producers of liquid penetrants.

The new ISO 3452-5 classifies liquid penetrants for use at medium (called “M”, from 50°C to 100°C), high temperature (called “H”, from 100°C to 200°C) or “range as specified by the manufacturer”.

Some practical problems have raised questions from some Companies: “I have been called for some LP tests on hot parts, but on the field I found out that only some parts were above 50°C, while others were already below this “limit temperature”...

Can I still use your high temperature penetrants and hence use only one product throughout the entire non-destructive test process? If yes, down to which minimum temperature?”

To better meet this kind of needs, NDT Italiana has qualified its high temperature liquid penetrant Elite K71HT for an “ETR” use (Extended Temperature Range).

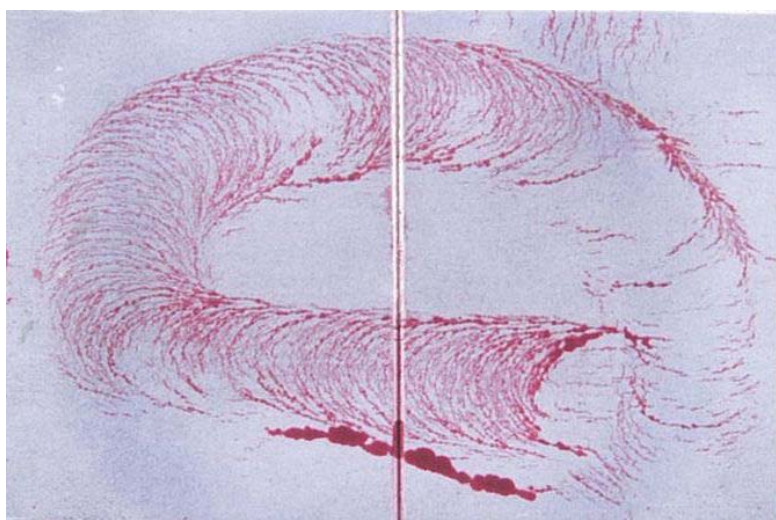
Elite K71HT is qualified “IIACcde – 2/ 10°C-200°C”, which means it can be used from +10°C to +200°C (and 20°C more, as the Standard requires, so maximum temperature not to overcome is 220°C). The rest of the codification according to the Standard means: Type II (red), Method A & C (removable with water or solvent), form c, d/e (both water and solvent- based developers), sensibility level 2.

The new ISO 3452-6 classifies liquid penetrants for low temperatures. Quoting the Standard: “testing products qualified for use at normal temperatures, in some cases, may also be suitable for lower temperature use”, which means that some liquid penetrants commonly used within the standard temperature interval (10°C-50°C) can also be used at lower temperatures. So here comes the question of the users:

“The liquid penetrant that I normally use, can be used also at temperatures lower than 10°C? And higher than 50°C? It would be very convenient for our Company to have in our procedure only one set of liquid penetrant, white developer and remover that can cover all the temperatures we usually work at.”

To meet these needs, NDT Italiana has qualified its red liquid penetrant Elite K71B2p for an ETR use.

Elite K71B2p is qualified “IIACcde – 2 /0°C-100°C” so it can be used from 0°C to 100°C. The first part of this codification according to the Standard means: “Type II (red), Method A&C (removal with water or solvent) form c, d/e (both water and solvent- based developers), sensibility level 2.



Picture 1: Liquid penetrant and developer used at 0°C (Test Panel ASME)

For what concerns developers, the standard non-aqueous wet developer covers temperatures from 0°C to 100°C; above it is necessary to use a white developer specifically formulated for high temperatures, that can be used from 80°C to 220°C as the ISO Standard prescribes.

In alternative a water-based developer can be used (Form c) that can guarantee the highest safety of use and, being the temperatures very high, dries up quickly.

We take the chance to remind the importance, at all temperatures, to get a thin and non-covering layer of white developer, as explained by ISO 3452-2 at point 6.15: “ The developer shall give a fine, even, non-reflective coating ”, as confirmed also by ASTM E1418 paragraph 7.1.7.2 .

In other words these Standards specify that the metallic surface has to be visible through the developer, in order to avoid missing any small defect; if the part appears like “white painted” it needs to be reprocessed all over again (well explained also in some Companies’ Specifications like EDF, G.E., etc.).

We would like to close this overview of the news regarding liquid penetrants with a big innovation regarding in particular the operator’s safety.

The risk we are dealing with is that of flammability, deriving from the use of highly flammable components that are commonly used nowadays in the formulations of solvents and developers on the market.

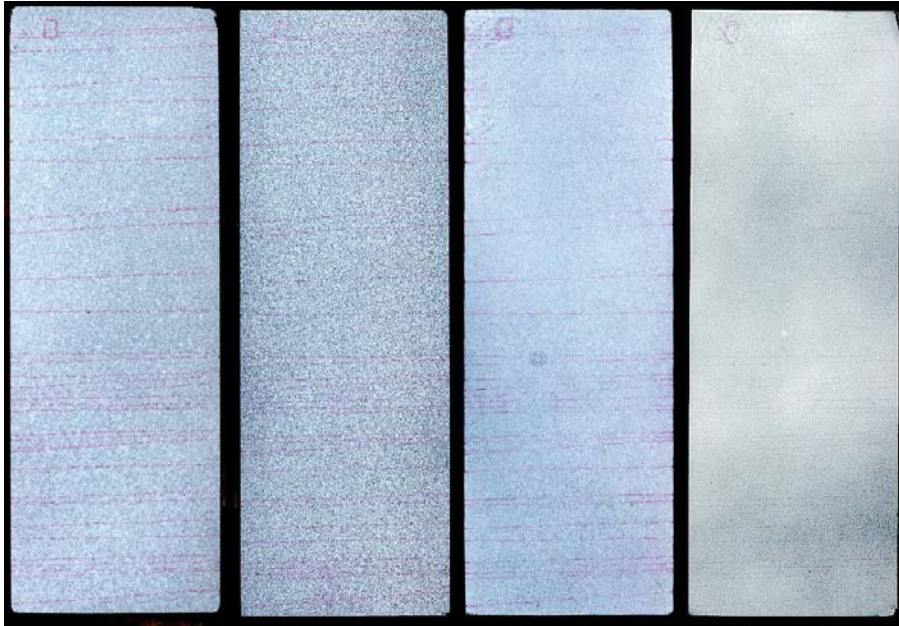
NDT Italiana has always invested considerable time and resources in research and development in its laboratories to eliminate these risks, by studying more ecological and safer formulations for its products.

The first water-based red penetrants were quite “coldly” met by users, because their main characteristics of non-toxicity and non-flammability had not been understood at that time.

Nowadays, water-based red penetrants used in combination with our non-flammable white developers are part of the internal PT procedure standard ASME of many Companies, and they have become a “must” when checking dangerous parts like inside tanks, reactors and exchangers, actively contributing to the Company safety.

We also shall not forget that water-based liquid penetrants have made it possible to test many non-metallic parts, and also the millions of parts annually produced by the automotive industry, allowing for limited water use and hence water treatment costs.

All the products used for liquid penetrants tests (liquid penetrant, developer, solvent) must be supplied with accurate Analysis Certificates that comply with all the current Specifics, which can avoid also problems when undergoing an Auditing process.



Picture 2: *Four visible LP tests compared. The third from the left is the water-based red penetrant used in combination with the water-based developer; all others are traditional penetrants with non-aqueous wet developer*