

Liquid Penetrant Testing



Thanks to its [Applus+ XRI](#) facilities, [Applus+ Laboratories](#) provides a full range of liquid-penetrant NDT services to fit the stringent demands of the aerospace industry. Whether it's a case of high-volume production or of testing individual, large, complex objects, we offer a quick turnaround and a high degree of reliability.

What is Liquid Penetrant Testing?

Liquid penetrant testing (LPT), also known as dye-penetrant inspection, liquid penetrant inspection, or penetrant testing, can be carried out using either visible or fluorescent dye penetrant. It is one of the oldest methods of non-destructive testing still in use today. This is due to its simplicity and remarkable sensitivity locating very fine surface discontinuities.

The importance of penetrant liquid for the aerospace industry

Fluorescent dye penetrant is heavily utilized in the aerospace industry and other industries that require a higher level of sensitivity than can be achieved using visible dye.

It may be used on a variety of non-porous [materials](#) including forgings, castings, ferrous and non-ferrous [metals](#) including aluminum and magnesium, ceramics, glass and some [plastics](#). Many formulations comply with low sulfur and low halogen requirements, and some have high flash points, high stability, nonvolatile states, and low toxicity.

What is liquid penetrant testing used for?

Aviation liquid penetrant testing is a non-destructive testing method commonly used to identify defects in non-porous aircraft materials such as aluminum and titanium. It can be applied to inspect:

- Welds
- Turbine engines
- Inlet and outlet blowers
- In-service parts
- Forged parts
- Engine and valve components
- Heat treated parts

What is the process for Liquid Penetrant Testing?

Liquid penetrant testing follows a very specific process which is explained below.

1. Test material cleaning

The surface where the penetrant test will be carried out is cleaned by applying solvents, alkaline or steam degreasing or sandblasting. This will help to remove dirt, paint, grease or residues that prevent the test from being carried out.

2. Penetrant liquid application

A colored penetrant liquid is applied to the surface of the material being tested. The liquid is introduced into the defective areas open to the surface by capillary action and then spreads through the material. Consideration should be given to the surface finish or size of the test piece when selecting a specific type of penetrant.

3. Penetrant liquid excess removal

Excess penetrant liquid is removed by washing with water, solvents or a lipophilic post-emulsifier or a hydrophilic post-emulsifier. It is important to take the necessary precautions to avoid erroneous indications.

4. Application of developer

The liquid is drawn into defective areas open to the material's surface through capillary action and then drawn out to reveal itself to detection using UV lights or other methods, depending upon the type of penetrant and dye coloring used.

5. Damage inspection

Fluorescent dye penetrant is typically green and uses a white developer to draw the dye back to the surface from inside the discontinuities by 'wicking' or capillary action. The fluorescent penetrant is characterized by its ability to emit visible radiation when excited by UV-A light and may be used on a variety of materials. Fluorescent penetrant is typically more sensitive than visible dye and is ranked into 4 levels of sensitivity.

Applus+ Laboratories accreditations for liquid penetrant testing

We count with the required Nadcap accreditation to perform liquid penetrant testing on [aerospace components](#). Our technicians are trained in accordance with a written practice that complies with NAS410/EN4179 and available to meet clients' needs as challenges arise. Additionally, we only use penetrant supplies from reputable manufacturers who ensure their products meet code requirements.

Benefits of liquid penetrant testing

Liquid penetrant testing, when applied properly, can also provide:

- Increased product reliability.
- Improved production processes by identifying problems in a timely fashion.
- Reduced costs due to fewer returned items and fewer rework cycles.
- Overall improved quality.

Why choose Applus+ Laboratories for liquid penetrant testing?

One of our main missions for our Applus+ Laboratories NDT testing experts is to guarantee that our customer products reach their highest standards of integrity, safety, and reliability. Thanks to this, we've become a trusted NDT testing solutions partner for aerospace manufacturers in the US and globally.

Partnering with Applus+ Laboratories, a Nadcap-approved provider, assures our clients that they are complying with industry requirements.