

**Lesson Objectives:** Upon completion of the demonstration on the proper steps to follow when conducting a Penetrant Test, which is a form of nondestructive testing, and given ample time to practice, the student will be able to correctly follow the basic set up and operation of the NDT using the dye penetrant kit with 100% accuracy.

**Task:** 16-5 Conduct a Penetrant Test

**Time:** 20 minutes

<b>Equipment/Materials:</b> Spotcheck Dye penetrant kit.	<b>References:</b> Magnaflux dye penetrant procedure handout.
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**Technical Standard(s):** AWS EG2.0-95 A-1 Follow safe practices.

**Academic Standards: Subject Area 1: Reading, Writing, Speaking, and Listening**

Category: R11.A Comprehension and Reading Skills

Anchor: R11.A.2 Understanding nonfiction appropriate to grade level

Descriptor: R11.A.2.2 Identify and apply word recognition skills

References: 1.1.11.F Understand the meaning of and apply key vocabulary across various subject areas

1.1.11C Use knowledge of root words from literacy works to recognize and understand the meaning of new words during reading. Use these words accurately in speaking and writing.

Standard Area: 1.9 Information, Communication, and Technology Literacy

Grade Level- 1.9.12: Grade 12 English IV

Writing Standard: 1.9.12.A Use media and technology resources for research, information, analysis, problem solving, and decision making in content learning. Identify complexities and inconsistencies in the information and the different perspectives found in each medium

**Introduction:** In nondestructive testing (NDT), one of more common inspection techniques used is the dye penetrant test (PT). The PT is used to locate surface flaws such as cracks, and other surface discontinuities that might be difficult to see with the human eye. Dye penetrant is applied to both ferrous and non-ferrous materials. Porous materials are avoided due to the false indications that the material may present after testing. I have seen this used on critical welds such as bridge components and on structural support beams that need to be randomly inspected. This inspection method can be used on a variety of applications that require visual inspection of the surface.

**Body:** The part to be tested is first cleaned. After the part is completely cleaned, the person conducting the test is required to apply the penetrant to the area of inspection. Application can be by spraying or by brushing the penetrant on the section. The penetrant will remain on the part for about 10 – 30 minutes to soak into any defects, the longer it stays on the part, the more chance you have locating fine or tight cracks. After the

penetrant has had time to dwell on the area of inspection, it is time to remove the penetrant from the surface. Spray the cleaner onto a rag and begin removing the penetrant from the surface. Avoid spraying or flooding the part with the cleaner as it may remove the penetrant from cracks or other discontinuities. After the surface is free from any visible penetrant, it is time to spray the area with the developer. Spray a thin layer and wait for it to dry. Large cracks will start to become visible rather quickly, while small fine cracks may take a little longer to show. The penetrant is red in color and the developer is white. The developer will pull the red penetrant to the surface and it will be easy to recognize that the part has a defect. Afterwards, whether you had an indication or not, you will need to remove the developer from the part using the cleaner.

**Summary:**

Follow the steps to successfully conduct a Penetrant test.

1. Cleaning- spray the cleaner onto the part and remove any oils, dirt, or film that may affect the test. Wipe dry.
2. Apply penetrant- spray or brush onto part. Allow time to soak into any discontinuities.
3. Remove penetrant- spray cleaner onto a clean rag and wipe surface until all of the red penetrant is removed from the surface.
4. Apply developer- spray a thin layer onto the area to be inspected. Indications will appear red as the penetrant is pulled to the surface of the white developer.
5. Evaluate the area. Identify any areas of concern. If a repair is needed, clean and repair. After the repair, repeat inspection. Clean area after inspection has been successful.

**Assignment/Evaluation:** Each two-person team will be evaluated by the correct procedures to conduct and inspect their project using the penetrant test.