

CONSERFLOW S.A. DE C.V.**PENETRATING LIQUIDS****CODE**

PCC-06

REVISION

02

EMISSION

12.APR.23

SIGNATURE CONTROL

DEVELOPED	REVISED	AUTHORIZED
Karla Alamillo Reyes NAME	Areli Roque Cruz NAME	Diego Cruz Martínez NAME
SIGNATURE	SIGNATURE	SIGNATURE
SGI Administrator STAND	Quality Control Manager STAND	General Manager STAND

CHANGE CONTROL

DESCRIPTION OF THE CHANGE	REVISION	DATE
The translation of this PCC-06 procedure is included in the SGI, the English version is integrated with the same control data as the Spanish document. Modification of associated formats for managing the English Spanish version.	02	12.APR.23
Integration of the Reference Documents, Definitions and responsibilities sections.	01	13.AUG.22
Creation and issuance of the procedure.	00	28. JUN.21

OBJECTIVE OF THE DOCUMENT


Establish the technical parameters that are applicable for the inspection by the method of penetrating liquids, for the detection of open discontinuities to the surface in non-porous materials and other materials in accordance with sections VIII Divisions 1 of the ASME code, ASME B31.3, ASME B31.4 and ASME B31.8

SCOPE OF THE DOCUMENT

This method covers the procedures for the examination by the method of Penetrating Liquids of materials for the detection of discontinuities that are open to the surface such as: fractures, fuse faults, pores, are applicable in process manufacturing, final product and maintenance inspection.

REFERENCE DOCUMENTS

- International Standard Quality Management Systems ISO 9001:2015
- International Standard Environmental Management Systems ISO 14001:2015
- AWS D 1.1
- ASME B 31.3
- ASME B31.4
- ASME B31.8
- API 1104
- API 650
- Recommended Practice N° SNT-TC-1A (The American Society for Nondestructive Testing).
- ASME Section VIII, Division 1, Index 8.

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DEFINITIONS

Pollutant. Any foreign substance presents on the examination surface, which will affect the Penetrating Liquids technique.

Contrast. The difference in visibility (Brightness or Coloration) between an indication and its surroundings.

Discontinuity. A lack of continuity or cohesion, an intentional or unintentional interruption in the structure of the material or component.

Defect. One or more relevant indications whose size, shape, orientation, location and properties do not meet the acceptance criteria.

Developer. A material that is applied on the examination surface, to extract the Penetrant and contrast the indications.

Developing time. The time lag between the application of the developer and the examination of the area.

Evaluation. Interpretation of indications to determine whether they meet the acceptance criteria.

Indication. The response or evidence of nondestructive examination that requires interpretation to determine its relevance.

False indication. Indication that is interpreted and may cause a condition different from the one shown.

RESPONSIBILITIES

Quality Control Inspector- Painting:

- Perform the penetrating fluid test according to this procedure
- Make the pertinent reports derived from this procedure.
- Deliver the documentary evidence for integration into the Quality Dossier.
- Improve the proper management of waste.

Construction Supervisor:

- Supervise that activities are carried out properly.
- Verify the findings established by the Quality Control Inspector
- Perform actions to correct the rejections established by the Quality Control Inspector.

DESCRIPTION OF THE PROCEDURE

Responsible	Activity	Registros								
Quality Control	<p>1. INTRODUCTION</p> <p>The method by Penetrating Liquids is characterized because it has great sensitivity and is based on the principle of CAPILLARITY, it is applied for the detection of discontinuities open to the surface detecting fissures, pores, etc. present in the materials examined.</p> <p>The procedure consists of applying a liquid Of red pigmentation to the surface under study, which penetrates any discontinuity that may exist due to the phenomenon Of capillarity, after a certain time the excess liquid is removed and a developer is applied, which absorbs the liquid that has penetrated the discontinuities and on the layer of the developer the contour of these is delineated.</p> <p>The applications of these techniques are wide, ranging from the inspection of critical parts such as aeronautical components, metallic materials, glazed ceramics, plastics, porcelain, electrochemical coatings, among others. One of the disadvantages of this method is thatit is applicable to non-porous surfaces.</p> <p>Table 1 Penetrating Liquid Inspection Techniques</p> <table><tr><th>TYPE I</th><th>FLUORESCENT</th></tr><tr><td>C – Penetrating</td><td>Removable with Solvent.</td></tr><tr><th>TYPE II</th><th>VISIBLE</th></tr><tr><td>C – Penetrating</td><td>Removable with Solvent</td></tr></table>	TYPE I	FLUORESCENT	C – Penetrating	Removable with Solvent.	TYPE II	VISIBLE	C – Penetrating	Removable with Solvent	<div>Penetrating liquid</div> <div>ASTM E-165 ASME Section V</div>
TYPE I	FLUORESCENT									
C – Penetrating	Removable with Solvent.									
TYPE II	VISIBLE									
C – Penetrating	Removable with Solvent									
Quality Control	<p>2. SAFETY PRECAUTIONS</p> <p>They must be in accordance with the instructions supplied by each manufacturer of the materials. Those that in their content have highly volatile solvents should be used with caution since the vapors can be toxic or irritating to the skin on contact and their handling should be with caution given their flammable power.</p> <p>3. LIQUID PROCEDURE PENETRANTS</p> <p>A. SURFACE PREPARATION</p> <p>For the application of Penetrating Liquids, the CANTESCO Mark will be used, it is recommended to review the Data Sheets of said product.</p> <p>1) Cleaning</p> <p>To carry out this method of penetrating liquids, it depends on the surface being free of any contaminants that interfere with the process. All parts must</p>									

Quality Control

be clean and dry before applying the penetrant, therefore, it has to be prepared properly.

This preparation includes the removal of oxides, layers of paint, slag or other covers, performing a deep cleaning eliminating all types of contaminants, so that it removes all traces of grease, oils, dirt, dust, etc., applying mechanical methods, such as shot blasting or brushing.

The **ASTM E-165** and **ASME Section V** standards, mention different cleaning methods can be with detergents, solvents, remover, degreasing steam, ultrasonic cleaning, blowing with abrasive, (as long as it does not hide open defects).

2) Drying after cleaning.

It is essential that the parts are vigorously dried, so that there is no water or solvent retained in the defects, as these will prevent the entry of the penetrant. Drying is done with infrared lamps, stoves or simply with hot air.

B. APPLICATION OF THE PENETRANT

The form of application of the penetrant does not depend on the technique used, but fundamentally on the conditions in which it must be applied and the shape, size and quantity of pieces to be examined.

By spraying, atomizing or spraying: It is the most common way to apply the penetrant, since the spray can be obtained using pressurized air or aerosols. However, the convenience of its application, care must be taken to ensure that the dew is homogeneous. In addition, it is convenient to use a brush or brush to cover those areas that due to their physical situation prevent the dew from reaching them.

Quality Control

It is recommended for the sporadic inspection of small batches or parts already installed in their final assembly, on flat or relatively large surfaces; But it should be avoided in small parts because the penetrant is wasted

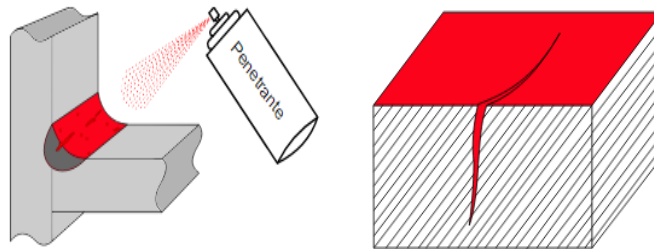


Figure 1 Placement of the penetrating liquid

Penetrating liquid aerosol

Penetrating liquid aerosol

The objective is to cover the entire piece to obtain a thin and uniform film over the entire surface. When obtaining this film, a period known as "**penetration time**" must be expected, during which the liquid will enter the discontinuities. Generally, the penetration time ranges from 5 to 15 minutes. This depends on the material being inspected and the type of cracks that occur.

C. REMOVAL OF THE PENETRANT

Quality control In this stage the best sensitivity of the method is ensured, once the penetrating liquid has been achieved to enter the defect, as much as possible is retained in it until the developing stage.

Normally the same solvent is used for the pressure and for the removal of excess penetrant.

Excess penetrant is removed with an absorbent material, which leaves no residue, by rubbing the inspection surface (preferably in only one direction); Then with the absorbent material, slightly moistened in the solvent, the excess penetrant that has remained on the surface is removed. To verify that the piece is free of penetrant, it is advisable to pass a clean absorbent material on the surface, which must be color-free...

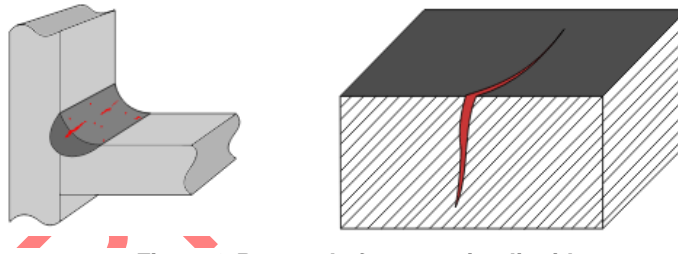


Figure 2 Removal of penetrating liquid

Quality Control

This is the most important step of the process, since its correct realization will depend on the result of the inspection. If you do not properly remove the liquid penetrating the results, false defects will appear.

D. REVEALED

Quality Control This stage consists of the application of a thin layer of very fine powder (finally pulverized) on the surface to be examined, which helps to extract the penetrant from them. Once it is applied, you will see waiting between 5 and 15 minutes.

The powder absorbs the penetrating liquid retained in the defects, functioning as a capillary tube (small circular and very narrow section) and concentrates it on the surface, allowing its visualization, in the case of

Inspection port
with
Penetrating
Liquids (PCC-
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Quality Control
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Quality Control Inspector

fluorescent penetrating liquids the developer allows to increase the contrast, and this will make us notice its defects at all sight.

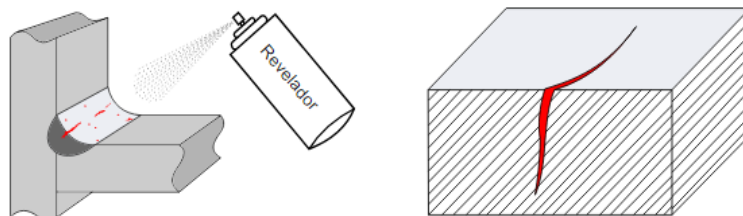


Figure 3 Application of development

The developer can be aqueous suspension powder (soluble powder suspended in water) or non-aqueous suspension powder (non-soluble powder suspended in a liquid of easy evaporation, such as isopropyl alcohol, acetone, etc.) The latter can be used in all types of penetrants and processes.

This developer is the one that gives the highest sensitivity, before application, the developer must be shaken and sprayed on the surface.

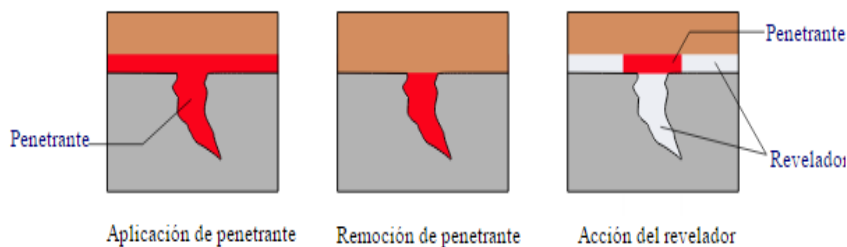


Figure 4 Developing (Capillary action)

E. OBSERVATION AND EVALUATION OF INDICATIONS

Observation of the indications should be initiated immediately after drying of the developer and repeated at least once after approximately 10 minutes.

Indications (defects) will usually be seen in a deep red with a white background on the developer layer. The intensity of the color and speed with which it spreads are related to the depth of the defect.

Within the types of surfaces defects we have: very fine pores, indicated by points distributed randomly or grouped in localized areas, very narrow or partially closed fissures indicated by a line of strokes and cracks as narrow and elongated openings.

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Non-Compliant
Outputs
Report (PCC-
14/F-01)

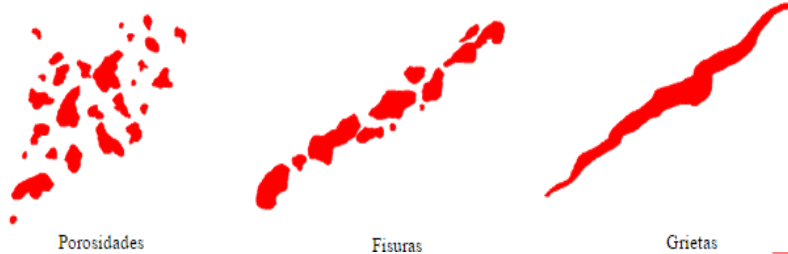


Figure 5 Types of surface defects

F. FINAL CLEANING

It is the removal of the remains of the penetrating liquid and the developer used, to prevent possible attacks on the examined material and recover the initial state of the surface.

Penetrant Liquid Testing is recorded in the *Penetrant Liquid Inspection Report (PCC-06/F-01)*. In all sheets, General information records the Project (or project number), equipment, customer, item, consecutive report number (as mentioned in *Quality Control (PCC-01)*) and date.

In the first sheet, in specifications the applicable standard is recorded in application criteria, the reference to the procedure (internal or external if required) with its revision, the plane number with its corresponding revision level, the type of penetrating liquid and the method are marked.

In technology and materials, characteristics such as temperature, materials, thickness, finish, lighting, brand, type and batch number of the products used in the application and drying/pre-cleaning time, penetrant, emulsifier, drying and developing and possible additional observations are recorded. The second sheet identifies the weld, its location, discontinuity, evaluation if it is accepted or rejected and in case of being rejected the location of the defect is noted.

On the third sheet are attached photographs and images as evidence of the inspection. At the end of each sheet is recorded the name and signature of the person who reviewed and who authorized.

4. DEFECT REPAIRS

Once defects outside the acceptance range have been detected, the inspector or quality control officer must notify the Project Supervisor and when necessary or major defects must be recorded in the *Non-Conforming Outputs R (PCC-14/F-01)*, in order to establish a background on the corrections or repairs of the defects.

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Unacceptable imperfections should be repaired and re-examined with Penetrating Liquids to ensure removal or reduction to an acceptable size.

FORMATS ASSOCIATED WITH THE PROCEDURE

CODE	REGISTRATION	REVIEW LEVEL	RETENTION TIME
PCC-06/F-01	<i>Inspection Report with penetrating liquids</i>	01	1 year in physical / Digital without expiration