



## Process description

The liquid penetrant test procedure allows a quick determination of surface discontinuities on all iron metals and non-iron metals, some plastics and ceramic materials, glass, etc., provided that the discontinuities are open to the surfaces. This procedure is used in the examination of welding seams, cast pieces, in shipbuilding, automobile and aircraft construction, apparatus and tank construction, etc.

The penetrant test procedure is based on the fact that a red or green-fluorescent penetrant (due to its specific characteristics) does not only spread optimally on a surface, it also penetrates in every discontinuity open to the surface.

After a penetration time of 10-15 minutes (depending on material, temperature and requirements) the excess penetrant respectively the penetrant that did not penetrate into possible discontinuities is removed from the surface. The excess penetrant removal can be carried out by either water or a special solvent remover. Subsequently, you can produce an indication of the discontinuities by application of a developer.

By its own specific characteristics, the white developer absorbs the penetrant that remained in the discontinuities. Thus discontinuities can be seen well as clear lines or points on the white underground.

### There are two penetrant test procedures:

**1) Daylight procedure** with penetrant red or penetrant red + fluorescent: the pattern of the defect or discontinuity appears as red indication on a white background and, depending on the kind of penetrant, may also be viewed as fluorescent indications under UV-light.

**2) Fluorescent procedure** with penetrant fluorescent: the pattern of the defect or discontinuity appears under UV-light as a fluorescent indication.

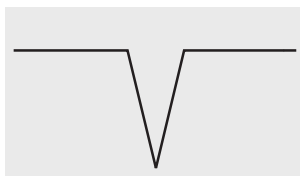
The test procedure consists of four separate processing steps, for which the following products are necessary:

**1. Precleaning (MR<sup>®</sup> Remover)**

**2. Application of penetrant (MR<sup>®</sup> Penetrant)**

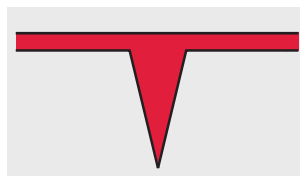
**3. Excess penetrant removal (MR<sup>®</sup> Remover or water)**

**4. Application of developer (MR<sup>®</sup> Developer, white)**



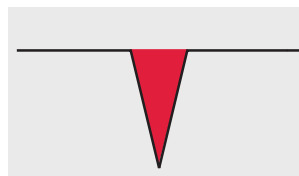
### 1. Step

precleaned  
surface with defect



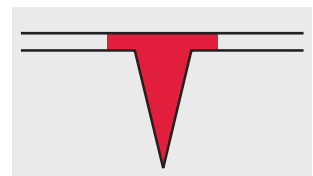
### 2. Step

surface defect  
with Penetrant



### 3. Step

surface defect after  
removal of excess  
penetrant



### 4. Step

surface defect after  
developing with  
red indication



### **1. Step: Precleaning with MR<sup>®</sup> Remover**

The workpieces resp. the areas of the workpieces which are to be examined must be cleaned thoroughly: rust, scales and other contaminations must be removed with suitable tools, other contaminants (oils, greases, etc.) must be removed from the surface with MR<sup>®</sup> Remover. Before taking the next step the surface should be in a clean, dry condition, so that the penetrant can enter the surface discontinuities.

### **2. Step: Application of MR<sup>®</sup> Penetrant red, MR<sup>®</sup> Penetrant red + fluorescent or MR<sup>®</sup> Penetrant fluorescent (waterwashable)**

MR<sup>®</sup> Penetrant red or fluorescent can now be either sprayed or brushed onto the dry, grease-free workpiece; another possibility of application is to immerse the workpiece into a penetrant bath. The recommended penetration time is usually between 5 and 30 minutes.

### **3. Step: Removal of excess penetrant with MR<sup>®</sup> Remover or water**

The excess penetrant can be removed either by rinsing with water, wiping with a special cloth (with or without MR<sup>®</sup> Remover) or spraying MR<sup>®</sup> Remover. The penetrant is to be removed thoroughly but without washing it out of the discontinuities. Removal of a fluorescent penetrant must be checked by using UV-light. Allow surface to dry before taking the next step.

### **4. Step: Application of MR<sup>®</sup> Developer**

most rational application of MR<sup>®</sup> Developer is by using aerosols, the developer film should be thin and even. Of course, a spray gun can also be used. After a drying time of 5-20 minutes possible discontinuities can be seen on the surface:

- using the daylight procedure, red indications will appear on the surface; if using MR<sup>®</sup> Penetrant red + fluorescent the indications can additionally be viewed under UV-light
- using the fluorescent procedure, fluorescent indications will appear under UV-light

The wider and deeper a discontinuity, the wider and more intensive the indication is.

MR<sup>®</sup> Developer can be removed easily after inspection.

MR<sup>®</sup> Products for penetrant testing are approved according to EN ISO 3452-2. Regarding the contents of corrosive ingredients they meet the requirements of EN ISO 3452-2 and ASME Code V, Section V, Article 6, T-641.

MR<sup>®</sup> Products for penetrant testing are produced in batches which are being tested according to these standards. Batch certificates can be provided upon request.