Penetrant Classification System

<table>
<thead>
<tr>
<th>Penetrants</th>
<th>Type I</th>
<th>Type II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type I</td>
<td>Fluorescent</td>
<td>Visible (Red)</td>
</tr>
<tr>
<td>Type II</td>
<td>Liposolvent</td>
<td></td>
</tr>
<tr>
<td>Type III</td>
<td>Hydrophilic</td>
<td></td>
</tr>
</tbody>
</table>

Removal Method: Method A Water Removable
Method B Lipophilic Emulsifier (oil base)
Method C Solvent Wipe
Method D Hydrophilic Emulsifier (water base)

Removers: Class (1) Halogenated (nonflammable)
Class (2) Nonhalogenated (flammable)

Developers: Form a Dry Powder
Form b Water Soluble
Form c Water Suspendable
Form d Nonaqueous
Form e Nonaqueous

Fluorescent Level 1/2 Ultra Low
Sensitivity: Level 1 Low
Level 2 Medium
Level 3 High
Level 4 Ultra High

Frequency of In-Use Penetrant Tests – ASTM E-1417

Daily
- Water Pressure and Temperature
- Penetrant Contamination
- Developer Contamination
- Developer Performance
- Black Light Intensity
- Reflected & Filters
- Examination Area Cleanliness

Weekly
- Developer Contamination
- Water Based Penetrant
- Nonaqueous Developer Concentration (b & c)
- Visible & Black Light Integrity

Monthly
- Penetrant Water Content (method a only)
- Emulsifier Water Content (lipophilic only)
- Emulsifier Removability

Quarterly
- Penetrant Brightness
- Calibrate Drying Oven
- Calibrate Light Meter
- Water Pressure Gage Calibration
- Water Temperature Gage Calibration

Semi-Annually
- Penetrant Removability (method a only)
- Penetrant Sensitivity

Annually
- The shelf life for the stored product is three years from the ship date.
- The shelf life for product that is stored in excess of 60 days should be verified every three years by the following tests: Product in its original container should be used within 60 days from the date of shipment. Test for moisture, gas, and vacuum, and if needed, for shipment in the container, should be verified in compliance with ASTM D1417 (1997) and MIL-D-19706, 1995, for certified products. Alternatively, the shelf life for the stored product shall be 90 days, if there is no evidence of degradation or contamination.
- The shelf life for the stored product shall be 90 days, if there is no evidence of degradation or contamination.

Note: This manual provides a list of the required in-use material tests.

Shelton Incorporated provides a full line of products and related services, including:

- Penetrant Products
  - Visible & Fluorescent
  - Cleaners & Transparents
  - Emulsifiers
  - Developers

- Test Panels
  - PSM-6 or JAS 14640 Certified
  - TMS-6 or JAS 14640 Certified
- Test KDS Panels
- Twin Nickel Chrome Panels
- Wash Test Panel 1 and 2
- Crushed Aluminum Hips
- Panel Recertification
- Photo and Shape of Indications

Laboratory Services
- In-Line Penetrant Testing
- In-Line Mag Particle Testing
- Custom Products

Materials Guide

Shelton Incorporated has 2 locations in the U.S. to serve your penetrant needs: Shelton products are available worldwide – see website for details.

Manufacturing and Laboratory Facility
Shelton Incorporated - California
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Phone: (310) 645-4134
Fax: (310) 645-4170
Email: info@sheltoninc.com

Shelton Incorporated – Kentucky
1711 Distribution Drive
Burlington, KY 41015
Phone: (859) 521-6881
Fax: (859) 521-6497
Email: sheltoninc@bally.com

www.sheltoninc.com
## Fluorescent Penetrants

**Post-emulsifiable (Method B, C, & D)**
- Works, castings, forgings of all metals and cast iron, including light alloy components.
- Excellent sensitivity, low penetrant concentration in high visibility, standardized nonaqueous solvent base, high visibility.

**Fluorescent Penetrant (Method A & C)**
- Works, castings, forgings of all metals and cast iron, including light alloy components.
- Non-ferrous use with high color content resultant paint.

**Water-washable**
- Works, castings, forgings of all metals and cast iron, including light alloy components.
- Excellent sensitivity, no penetrant concentration in high visibility, standardized nonaqueous solvent base, high visibility.

**Classifications**
- SAE/AMS Classification available in aerosol

### Magnetic Particle

<table>
<thead>
<tr>
<th>Product</th>
<th>Classification</th>
<th>Description</th>
<th>Typical Application</th>
<th>Special Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>ER-83C</td>
<td>Method D</td>
<td>Hydrophilic</td>
<td>Use with both fluorescent and non-fluorescent magnetic particles</td>
<td>High sensitivity</td>
</tr>
<tr>
<td>D-350</td>
<td></td>
<td></td>
<td></td>
<td>Medium sensitivity</td>
</tr>
<tr>
<td>KO-19</td>
<td></td>
<td></td>
<td></td>
<td>Medium sensitivity</td>
</tr>
<tr>
<td>RC-29</td>
<td></td>
<td></td>
<td></td>
<td>Medium sensitivity</td>
</tr>
<tr>
<td>FP-22B</td>
<td></td>
<td></td>
<td></td>
<td>Medium sensitivity</td>
</tr>
<tr>
<td>RC-50</td>
<td></td>
<td></td>
<td></td>
<td>Medium sensitivity</td>
</tr>
<tr>
<td>HM-220</td>
<td>Surfactant</td>
<td></td>
<td></td>
<td>High sensitivity</td>
</tr>
<tr>
<td>HM-604</td>
<td>Surfactant</td>
<td></td>
<td></td>
<td>Medium sensitivity</td>
</tr>
<tr>
<td>HM-440</td>
<td>Surfactant</td>
<td></td>
<td></td>
<td>Medium sensitivity</td>
</tr>
<tr>
<td>HM-3A</td>
<td></td>
<td></td>
<td></td>
<td>Medium sensitivity</td>
</tr>
</tbody>
</table>

## Penetrant Materials

- For the above process, please consult the Qualified Specialty Product List (QPL) of MIL-H-13530 and AMS-2914.

- Note: Some specialty products do not meet MIL requirements and are only used for special applications.

### Application Methods

- Spray, brushing, or flowing

### Solvents

- Water-washable: acetone, D-106, D-350, KO-19, ER-85, ER-85-1
- Post-emulsifiable: water-washable solvents (Method A & C)
- Post-emulsifiable: FLUORESCENT PENETRANT

### Safety

- No petroleum solvents for disposal, contains surfactants, corrosion inhibitors, and anti-foaming agents.
- No odor, no fluorescence, clear liquid, non-flammable flashpoint above 200°F.

### General

- Use with all visible or fluorescent penetrants.
- Use with both fluorescent and non-fluorescent magnetic particles.
- Widely used for manufacturing and maintenance inspection.

## Magnetic Particle

- High sensitivity
- Used for detecting flaws invisible to the naked eye.
- Used for detecting flaws invisible to the naked eye.

### Magnetic Particle Fluids

- Ideal for use on high contrast background.
- Use with both fluorescent and non-fluorescent magnetic particles.