

# PENETRANT CLASSIFICATION SYSTEM



**Two Penetrant Types:** There are two basic types of penetrants: fluorescent (Type I) and visible (Type II). Flaws indicated by visible penetrants may be seen under normal light. Flaws indicated by fluorescent penetrants are only seen under ultraviolet, or black, light.

**Four Removal Methods:** Excess surface penetrant is removed by washing with water or by wiping with a solvent. Some penetrants are intrinsically water soluble and are removed with a water wash. Other penetrants are non-water soluble and must be treated with an emulsifying agent before they can be flushed away with water. The two basic emulsifier types are "hydrophilic" (water base) and "lipophilic" (oil base).

Under appropriate circumstances, both water soluble and non-water soluble penetrants may be removed by wiping with solvents. There are two basic types of solvents: halogenated (non-flammable) and non-halogenated (flammable).

**Four Basic Developers:** Flaw indications are enhanced by using developers. There are four basic types of developers: dry powder, water soluble, water suspendable, and solvent suspendable.

**Fluorescent Penetrant Sensitivity:** Fluorescent penetrants are ranked according to their ability to detect flaws. Fluorescent penetrant sensitivity is identified by the US military's Qualified Products List.

**Military Specifications:** Current US military specifications, MIL-I-25315D, MIL-STD-6866, and the Qualified Products List establish a penetrant system classification scheme. The scheme ranks fluorescent penetrants in terms of their sensitivity and removal properties. It also classifies developers and removers. Various classes of penetrants are approved by the US government and major manufacturers for certain types of inspection operations. Penetrant users should insure that employed procedures meet production requirements. The penetrant classification scheme follows.

Penetrants:	Type I Type II	Fluorescent Visible (Red)
Removal Method:	Method A Method B Method C Method D	Water Removable Lipophilic Emulsifier (oil base) Solvent Wipe Hydrophilic Emulsifier (water base)
Removers:	Class (1) Class (2)	Halogenated (nonflammable) Nonhalogenated (flammable)
Developers:	Form a Form b Form c Form d	Dry Powder Water Soluble Water Suspendable Solvent Suspendable
Fluorescent Sensitivity:	Level 1/2 Level 1 Level 2 Level 3 Level 4	Ultra Low Low Medium High Ultra High

A specification that requires a "Type I, Method D, Level 4, Form a" penetrant system requires the most sensitive fluorescent penetrant used with a hydrophilic emulsifier and a dry powder developer.

**Consultation:** It is important that a penetrant system match production requirements, not only to insure that specifications are met, but also to insure that sensitivity levels and inspection methods meet inspection criteria. Some applications have very stringent criteria calling for the highest sensitivity, while others require lower levels of sensitivity. When penetrant systems are not appropriately matched to inspection criteria, unnecessarily high penetrant materials costs as well as the unnecessary rejection of parts can result. Sherwin Incorporated welcomes the opportunity to help users choose the appropriate combination of penetrant materials.

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