

## Penetrant Classification System

Penetrants:	Type I	Fluorescent
	Type II	Visible (Red)
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 Sensitivity:	Level 1/2	Ultra Low
	Level 1	Low
	Level 2	Medium
	Level 3	High
	Level 4	Ultra High

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

#### Each Shift

Water Wash Pressure and Temperature

#### Daily

Penetrant Contamination  
Dry Developer Condition  
Developer Contamination (form b & c)  
System Performance  
Black Light: Intensity, Reflectors & Filters  
Examination Area Cleanliness

#### Weekly

Emulsifier (hydrophilic) Concentration  
Penetrant Sensitivity\*  
Water Content (water based)  
Aqueous Developer Concentration (b & c)  
Visible & Black Light Integrity

#### Monthly

Penetrant Water Content (method a only)  
Penetrant Removability\* (method a only)  
Emulsifier Water Content (lipophilic only)  
Emulsifier Removability\*

#### Quarterly

Penetrant Brightness\*  
Calibrate Drying Oven

#### Semi-Annually

Calibrate Light Meter  
Water Pressure Gage Calibration  
Water Temperature Gage Calibration

**Note:** Table as it appears is not a complete summary of the required in-use material tests.

\*These tests may be combined and performed during the "system performance" test in accordance with 7.8.4.

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## MATERIALS GUIDE

**SHERWIN**  
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Sherwin Incorporated provides a full line of products and related services, including:

#### Penetrant Products

Visible & Fluorescent  
Cleaners & Removers  
Emulsifiers  
Developers

#### Specialized Penetrants

#### Magnetic Particle Products

#### Test Panels

PSM-5  
KDS Twin Panels  
Panel Recalibration

#### Laboratory Services

In-Use Testing  
Custom Products

#### Penetrant Inspection Accessories



Represented by:

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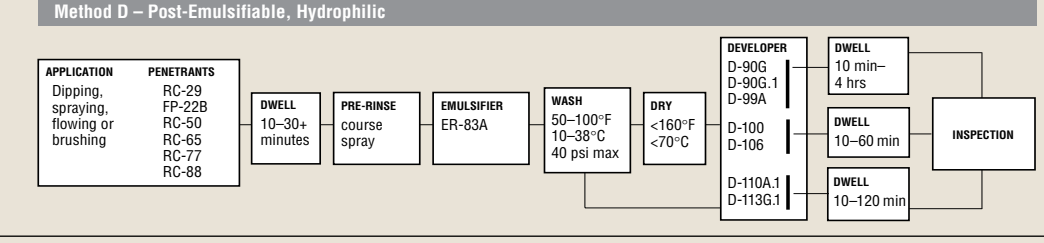
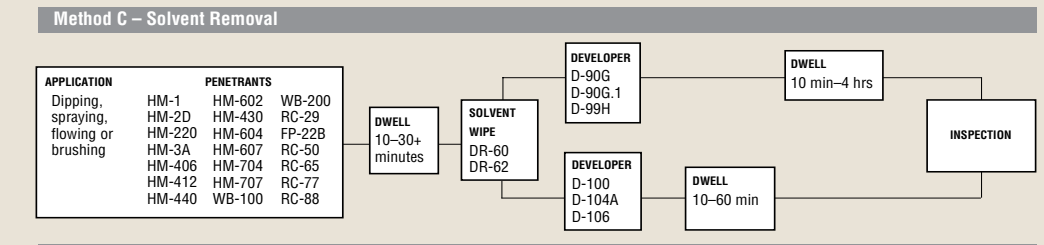
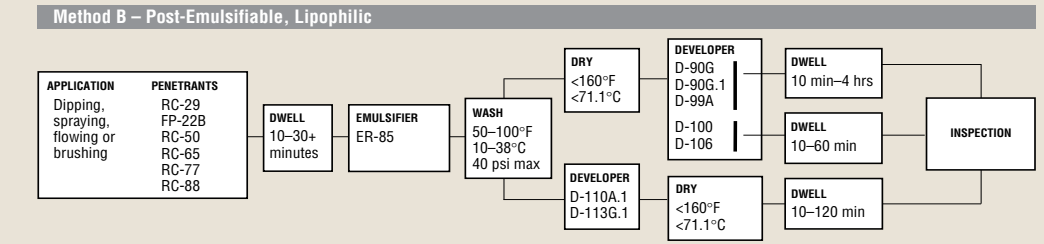
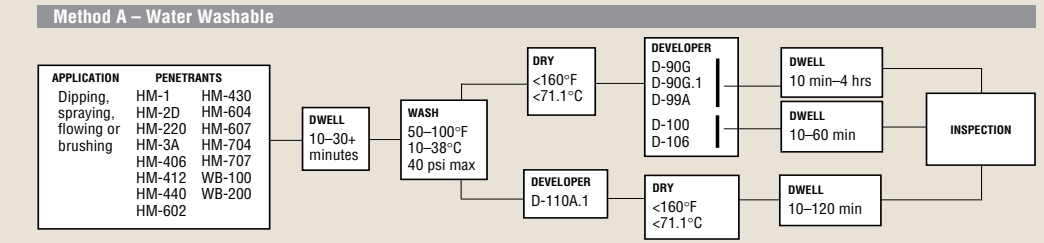
PRODUCTS	CLASSIFICATION TO AMS-2644	AVAILABLE IN AEROSOL	BIODEGRADABLE	DESCRIPTION	TYPICAL APPLICATION	SPECIAL FEATURES
<b>FLUORESCENT PENETRANT</b> Water-washable (Method A & C)						
TRI-A	N/A			surfactant-based	ceramic, plastic, and porous parts	crack detection without staining or use of developer
HM-1	Level 1/2			low sensitivity		
HM-2D	Level 1			low sensitivity	non-ferrous metal casting	
HM-220	Level 1		X	low sensitivity		
HM-3A	Level 2			medium sensitivity		
HM-406	Level 2	X		medium sensitivity	welds, castings forging and extrusions of automotive and aerospace,	excellent washability, low penetrant consumption due to low viscosity, excellent electrostatic spray capability
HM-412	Level 2			high level 2 sensitivity	ferrous and non-ferrous, air frame and turbine engine components	flash point over 200 degrees F
HM-440	Level 2		X	medium sensitivity		
HM-602	Level 2		X	medium sensitivity		
HM-430	Level 3			high sensitivity		
HM-604	Level 3		X	high sensitivity	turbine engine components including turbine blades and critical welds,	resists over-washing, low background and excellent electrostatic spray capability
HM-704	Level 4		X	high sensitivity	castings, forging and extrusions	flash point over 200 degrees F
HM-707	Level 4		X	ultra-high sensitivity		
<b>FLUORESCENT PENETRANT</b> Post-Emulsifiable (Method B, C & D)						
RC-29	Level 1			low sensitivity		
FP-22B	Level 2			medium sensitivity	welds, castings, forging in automotive, airframe and turbine engine	low penetrant consumption due to low viscosity, excellent electrostatic spray capability, superior heat resistance, fully approved and proven over two decades
RC-50	Level 2			medium sensitivity		flash point over 200 degrees F
RC-65	Level 3	X		high sensitivity	critical turbine engine components,	
RC-77	Level 4	X		ultra-high sensitivity	e.g. turbine blades, turbine engine rotating parts, discs, fan-blades	
RC-88	Level 4			ultra-high sensitivity		
<b>FLUORESCENT PENETRANT</b> Water-based (Method A & C)						
I-319 Water-based	N/A		X		liquid oxygen applications	water-base, LOX compatible
WB-100 Water-based	Level 1		X	low sensitivity	castings, forging in automotive	first approved water-based fluorescent penetrants
WB-200 Water-based	Level 2		X	medium sensitivity	airframe and turbine engine	biodegradable, resists over-washing, non-flammable
<b>EMULSIFIERS</b>						
ER-83A	Method D		X	hydrophilic	use with P.E. penetrants and DP-40	qualified to 30% max. concentration – high tolerance to contamination
ER-85	Method B			lipophilic	use with P.E. penetrants and DP-40	slow diffusion with lower risk of over-emulsification
<b>DEVELOPERS</b>						
D-90G						
D-90G.1	form a			dry powder	dust chamber – hand application, or powder bulb	stabilizes and enhances brilliance to indications
D-90H						
D-100	form d & e	X		nonaqueous alcohol	aerosol, sprayer	refined white particles give thin, more uniform layer
D-106	form d & e	X		nonaqueous acetone	aerosol, sprayer	refined white particles, dries fast into uniform layer
D-110A.1	form c			water-suspendible	dip tank	nonhazardous, economical developer for testing
D-113G.1	form b			water-soluble	dip tank	large number of parts
<b>CLEANERS / REMOVERS</b>						
DR-60	Class 2	X		hydrocarbon based	use with all visible or fluorescent	excellent solvent action- pre-cleaner and remover
DR-62	Class 2	X		hydrocarbon based		more volatile than DR-60, excellent pre-cleaner
LA-1 Cleaner	N/A			hot tank - alkaline	dilution, spray or immersion	non-corrosive, non-toxic, sodium-free
<b>VISIBLE DYE PENETRANT</b>						
DP-40	Method B & C & D	X		P.E. type	welding, castings, forging and extrusions of both ferrous and non-ferrous components and some plastics and ceramics	sharp indications through high color content
DP-50	Method A & C	X		water washable		resist over-washing, high color content
DP-51	Method A & C	X		water washable		flash point over 200 degrees
DP-52	N/A			water washable		
DP-54	Method A & C		X	easily water washable	rough castings	easy wash-off for use on heavily textured parts
BY-LUX	N/A	X		visible and fluorescent	second look with black light	no second application when closer look needed
<b>HIGH TEMPERATURE SYSTEM</b>						
K-017 Penetrant	Method A & C	X	X	high temp. visible dye	welding, castings, forging	inspection on hot surfaces, no need to cool down
K-019 Remover	Class 2	X		high temp. remover	at high temperature	parts reducing processing time and inspection costs
D-350 Developer	form d & e	X		high temp. developer		dwelt up to 350 degrees



# SHERWIN GUIDE TO PENETRANT PROCESSES

## TYPE I-FLUORESCENT PENETRANTS

- SHERWIN** penetrant materials are listed in the Qualified Product List (QPL) of MIL-I-25135E and AMS-2644-1
- NOTE: Some specialty products do not meet requirements and are only used for special inspections.*
- Rolls-Royce
  - Pratt & Whitney
  - General Electric
  - Snecma DMC
  - Aerospatiale
  - Turbomeca
  - FIAT Aviazione
  - Augusta
  - MTU
  - Garrett EMS
  - Allison
  - Douglas DMS
  - Airbus Industry
  - Boeing BAC 5423
  - Sikorsky Aircraft
  - Lockheed
  - General Dynamics
  - Northrop
  - ASME Code Sec V
  - RDT-F3-6T
  - AMS/SAE 2647
  - AMS-3155
  - AMS-3156
  - AMS-3157
  - Embraer
  - Bombardier



## TYPE II-VISIBLE PENETRANTS

