

Penetrant Classification System

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 Form e	Dry powder Water Soluble Water Suspensible Nonaqueous Nonaqueous
Fluorescent Sensitivity:	Level 1/2 Level 1 Level 2 Level 3 Level 4	Ultra Low Low Medium High 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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Penetrant Products

- Fluorescent - Water Washable
- Fluorescent - Non Water Washable
- Visible - Water Washable
- Visible - Non Water Washable
- Developer
- Emulsifier

Magnetic Particle Products

- Fluorescent
- Visible
- Visible & Fluorescent
- Dusting Powder

Test Panels

- PSM-5
- Twin KDS Panel
- Wash Test Panel
- Twin Nickel Chrom Panels
- Cracked Aluminium Blocks

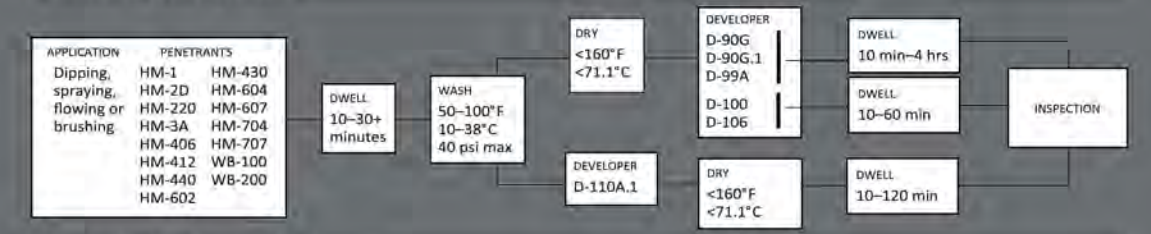
Laboratory Services

- Penetrant
- Fluorescent Brightness
- Water Content
- Removability
- Sensitivity
- Viscosity
- Water Tolerance
- Contamination / Separation
- Emulsifier
- Removability
- Water Content
- Magnetic Particle
- Viscosity
- Background Fluorescent

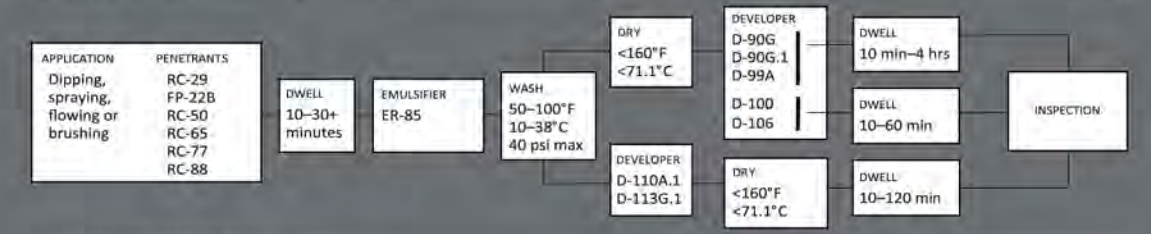
SHERWIN GUIDE TO PENETRANT PROCESSES

TYPE I - FLUORESCENT PENETRANTS

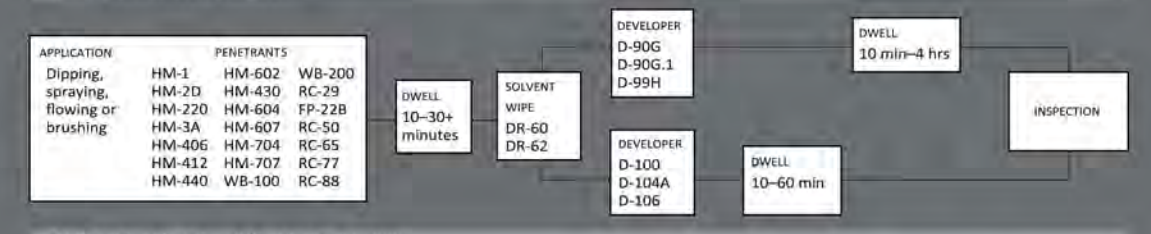
Method A - Water Washable



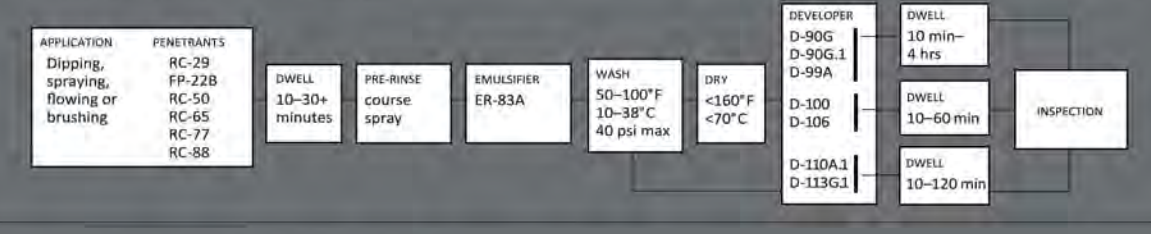
Method B - Post-Emulsifiable, Lipophilic



Method C - Solvent Removal

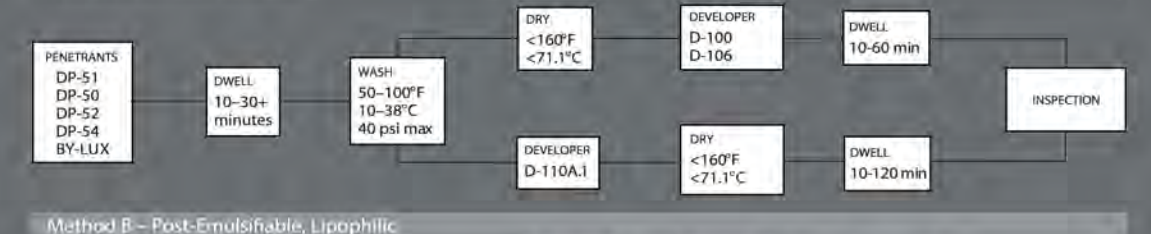


Method D - Post-Emulsifiable, Hydrophilic

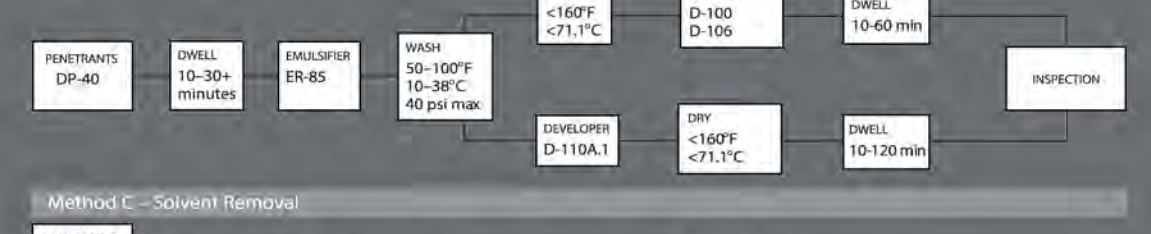


TYPE II - VISIBLE PENETRANTS

Method A - Water Washable



Method B - Post-Emulsifiable, Lipophilic



Method C - Solvent Removal



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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
- Aerospaziale
- 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

PRODUCTS	CLASSIFICATION TOAMS-2644	AVAILABLE IN AEROSOL	BIODEGRADABLE D	DESCRIPTION	TYPICAL APPLICATION	SPECIAL FEATURES
FLUORESCENT PENETRANT 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	non-ferrous metal casting	excellent washability, low penetrant consumption due to low viscosity, excellent electrostatic spray capability flash point over 200 degrees F
HM-2D	Level 1			low sensitivity		
HM-220	Level 1		X	low sensitivity		
HM-3A	Level 2	X		medium sensitivity	welds, castings forging and extrusions of automotive and aerospace, ferrous and non-ferrous, air frame and turbine engine components	resists over-washing, low background and excellent electrostatic spray capability flash point over 200 degrees F
HM-406	Level 2		medium sensitivity			
HM-412	Level 2		high level 2 sensitivity			
HM-440	Level 2		medium sensitivity			
HM-602	Level 2		X	medium sensitivity		
HM-430	Level 3	X		high sensitivity	turbine engine components including turbine blades and critical welds, castings, forging and extrusions	resists over-washing, low background and excellent electrostatic spray capability flash point over 200 degrees F
HM-604	Level 3		high sensitivity			
HM-704	Level 4		ultra-high sensitivity			
HM-707	Level 4		ultra-high sensitivity			
FLUORESCENT PENETRANT Post-Emulsifiable (Method B, C & D)						
RC-29	Level 1			low 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 flash point over 200 degrees F
FP-22B	Level 2			medium sensitivity		
RC-50	Level 2			medium sensitivity		
RC-65	Level 3	X		high sensitivity	critical turbine engine components, e.g. turbine blades, turbine engine rotating parts, discs, fan-blades	low penetrant consumption due to low viscosity, excellent electrostatic spray capability, superior heat resistance, fully approved and proven over two decades flash point over 200 degrees F
RC-77	Level 4		ultra-high sensitivity			
RC-88	Level 4		ultra-high sensitivity			
FLUORESCENT PENETRANT 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 airframe and turbine engine	first approved water-based fluorescent penetrants biodegradable, resists over-washing, non-flammable
WB-200 Water-based	Level 2		X	medium sensitivity		
EMULSIFIERS						
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
DEVELOPERS						
D-90G	form a			dry powder	dust chamber - hand application, or powder bulb	stabilizes and enhances brilliance to indications
D-90G.1				dry powder		
D-90H					dry powder	
D-100	form d & e	X		nonaqueous alcohol	aerosol, sprayer	refined white particles give thin, more uniform layer refined white particles, dries fast into uniform layer nonhazardous, economical developer for testing large number of parts
D-106	form d & e	X		nonaqueous acetone	aerosol, sprayer	
D-110A.1	form c			water-suspendible	dip tank	
D-113G.1	form b			water-soluble	dip tank	
CLEANERS / REMOVERS						
DR-60	Class 2	X		hydrocarbon based	use with all visible or fluorescent	excellent solvent action- pre-cleaner and remove more volatile than DR-60, excellent pre-cleaner
DR-62	Class 2	X		hydrocarbon based		
DR-64	Class 2	X		hydrocarbon based		
LA-1 Cleaner	N/A			hot tank - alkaline	dilution, spray or immersion	non-corrosive, non-toxic, sodium-free
VISIBLE DYE PENETRANT						
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 resist over-washing, high color content flash point over 200 degrees
DP-50	Method A & C	X		water washable		
DP-51	Method A & C	X		water washable		
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
HIGH TEMPERATURE SYSTEM						
K-017 Penetrant	Method A & C	X	X	high temp. visible dye	welding, castings, forging at high temperature	inspection on hot surfaces, no need to cool down parts reducing processing time and inspection costs dwell up to 350 degrees
K-019 Remover	Class 2	X		high temp. remover		
D-350 Developer	form d & e	X		high temp. developer		

