

Subject: Low Temperature Application for Spotcheck Products

SKL-SP1, SKC-S and SKD-S2 were evaluated at low temperatures. Previous testing of Spotcheck materials were done using cleaners and developers with chlorinated solvents (now obsolete) which worked well down to 35°F. With the switch to the nonchlorinated solvents, users are finding more inconsistent results when doing penetrant inspection at low temperatures. Difficulties arise because of the slower drying solvents in cleaners and developers.

At lower temperatures of 32 – 50°F, the cleaner/remover will take longer to dry. If 75°F is taken as the standard operating temperature, the drying times are as follows:

Temperature	Drying Time
75°F	Usual
50°F	2 x Usual
40°F	3 x Usual
32°F	4 x Usual

It is critical to make sure that the solvent has evaporated during the precleaning step either by wiping with clean, lint free cloth or using air dryers.

Likewise, penetration into the defects is affected, As temperature decreases, the viscosity of penetrants increases which slows down penetration significantly. Again, refer to the table below for the change in dwell time:

Temperature	Penetration Time
75°F	Usual
45°F	2 x Usual
32°F	2.5 x Usual

The effect of drying has become more significant in the developing step when using nonchlorinated, slower drying solvents. Our tests showed that the developing action is impeded because of the slower evaporation of the solvent. When the developer dries, the indications become fuzzy or show excessive bleed out. We were not able to get good results at 32°F because the developer remained wet and did not dry within a practicable amount of time. At 38 - 40°F, and with some air movement, developer film will dry at 5 times the usual time at 75°F.

One comforting note is that at low temperatures, we found good indications with extremely small and tight defects. The slow drying rate of the developer film allows greater bleed out of the penetrant from the defect. For large defects, longer development time causes excessive bleed out making interpretation more difficult.