



## Heat Treatments of Tool Steels before PVD Coating

Steel Grade	Tempering Temperature (F)	Minimum Number of Temper Cycles	HRC Hardness After PVD Coating
A-2	950-975	2	53-58
D-2	950-975	2	53-58
S-7	950-975	2	50-56
H-13	975-1050	2	38-42
420 SS	950-975	2	42-50
440C SS	950-975	2	48-56
M-2	1000-1075	2	60-62+
M-42	1000-1075	4	63+
T-15	1000-1075	3	63+

### Special Instructions

**Grinding** Coarse grinding can leave high spots which will wear through prematurely. Burrs will break off leaving uncoated edges on tools. Grinding burn, glazing, and cracking must be avoided to provide a surface best suited for PVD coating.

**Polishing, Burnishing and Buffing** Incorporated compounds and stresses into the surfaces must be minimized. Trapped compounds can lead to coating and corrosion difficulties. Relief of residual stresses can cause warpage or dimensional changes.

**Electro Discharge Machining (EDM)** White layer and cracks must be polished out of the EDM surface. Residual stress should be stress relieved below the tempering temperature shown above to insure coatability and performance.

**Previous Surface Treatments** Bare, uncontaminated, unoxidized, un-nitrided, and unplated surfaces are best for PVD coating.

**Braze Joints** Silver braze alloys containing Cadmium (Cd) must be avoided. Silver braze joint with Cadmium can lose as much as 30% of their strength in due to the PVD coating process conditions, and also contaminate the coating chamber. Braze joints must be free of fluxes. Soldered assemblies cannot be PVD coated.

**Multiple Tempers** Are advised for best dimensional and metallurgical structure stability and to promote optimum adhesion.

**Cryogenic Treatment** May prove beneficial for optimum dimensional stability.