

Heat Treatment of Tool Steels

Material (AISI)	Stainless Bag	Pre-Heat Temp.(F)	Pre-Heat Time/inch	Harden Temp.(F)	Harden Time/Inch	Quench Method	Temper Temp.(F)	Temper Time/inch	Quench Method	Hardness Low	Rc High	Second Temper	Distortion Inch/Inch
			1 Hr min		1 Inch Min								
S-7	YES	1250	1 hr	1725	45 Min	Air	600	2 hr	Air	54	56	YES	+.001"
A-2	YES	1300	1 hr	1735	45 Min	Air	500	1 hr	Air	56	60	YES	+.001"
A6	YES	1225	1 hr	1575	45 Min	AIR	350	1 hr	AIR	58	62	NO	+.001"
A-10 G.A.	YES	1250	1 hr	1475	45 Min	Air	400	1 hr	Air	56	62	YES	+.001"
4140	YES	1200	1 hr	1550	45 Min	175° Oil	750	1 hr	175° Oil	40	45	NO	+.001"
4340	YES	1200	1 hr	1475	1 Hr	175° Oil	900	1 hr	175° Oil	40	45	NO	+.001"
O-1	YES	1250	1 hr	1475	1 Hr	Oil	400	1 hr	Air	58	62	NO	+.001"
O6	YES	1250	1 hr	1475	1 Hr	Oil	400	1 hr	Air	58	62	NO	+.001"
D2	YES	1350	1 hr	1860	30 Min	Air	500	2 hr	Air	57	59	NO	+.001"
CVM 200	NO	Anneal if time permits		900	6	Air	N/A	N/A	N/A	40	48	NO	-.0006"
CVM 250	NO	Anneal if time permits		900	6	Air	N/A	N/A	N/A	48	52	NO	-.0009"
CVM 300	NO	Anneal if time permits		900	6	Air	N/A	N/A	N/A	50	55	NO	-.001"
CVM 350	NO	Anneal if time permits		940	4	Air	N/A	N/A	N/A	55	60	NO	-.001"

Revision I 8/13/2025 Corrected O6 material to O6

See Separate Sheet For 17-4 PH

See Separate Sheet For Anneal

NOTE: 5911

2. SECOND TEMPER TEMPERATURE IS 50 F BELOW FIRST TEMPER TEMPERATURE

Anneal

Material (AISI)	Notes	Stainless Bag	Anneal Temp.(F)	Anneal Time/inch	Cooling
				1 Hr min	
S-7		Yes	1535	1 Hr	Cool in oven overnight
4140		Yes	1575	1 Hr	Cool in oven overnight
4340		Yes	1550	1 Hr	Cool in oven overnight
A2		Yes	1550	1 Hr	Cool in oven overnight
A-10 (GA)		Yes	1450	1 Hr	Cool in oven overnight
1018 (A36)		Optional	1150	1 Hr	Cool in oven overnight
304 SS	Relieve Peak Stress Only	Optional	850	4	Cool in oven overnight
17-4 PH	Send Out - Do not do in house	N/A	N/A	N/A	N/A
CVM (All)	Perform if time permits	Yes	1500	1	Air

17-4 PH

Condition	Hardening	Hardening	Cooling	Hardening	Hardening	Cooling	HARDNESS	Rc
	Temp	Time/Inch		Temp	Time/Inch		Low	High
H 900	900	1	Air				40	47
H 925	925	4	Air				38	45
H 950	950	4	Air				37	44
H 1025	1025	4	Air				35	42
H 1075	1075	4	Air				32	39
H 1100	1100	4	Air				31	38
H 1150	1150	4	Air				28	37
H 1150+1150	1150	4	Air	1150	4	Air	26	33
H 1150-M	1400	2	Air	1150	4	Air	24	30
Full Anneal	Send out!							

A6 Heat Treating Instructions

1. Bring the XV51 part from room temperature to 700°C (1290°F), taking fifteen minutes to achieve this temperature. This should be done in air and require the oven to be preheated.
2. Gradually raise the temperature of the parts from 700°C (1290°F) to 840°C (1540°F), taking two hours to achieve this temperature.
3. Soak the parts at 840°C (1540°F) for one hour.
4. Quench the atmosphere with room temperature Nitrogen bringing the temperature down to 93°C (200°F), taking fifteen minutes to achieve this temperature.
5. Bring the parts to 38°C (100°F), taking fifteen to twenty minutes to achieve this temperature.
6. Sub-cool the parts in Nitrogen to -79°C (-110°F), taking ninety minutes to achieve this temperature.
7. Let the parts return to room temperature.
8. Temper the parts for three hours at 163°C (325°F).