

AuroraMai

SanMai / Copper-Nickel Laminate — Heat Treatment Specification

Revision 1.0 | Baker Forge & Tool, Boone NC

STEEL PROFILES

Copper and nickel accent layers over a 1084 carbon-steel core. Accent metals are non-hardening — the 1084 core drives the entire heat treat.

	1084 Mono Core	Cladding / Accent
Classification	Carbon / tool steel	Non-hardening copper + nickel
Carbon	~0.84%	N/A — non-hardening
Heat treat driver	Drives all HT decisions	Follows core — will not harden
Role	Cutting edge / hardening body	Fusion-welded accent layers

STEP 1 — NORMALIZE (DO THIS FIRST)

Relieve forge stress and refine grain before hardening. Copper, bronze, nickel and wrought layers are ductile — normalizing does them no harm.

Parameter	Spec
Cycles	2 cycles
Temp	1500°F
Hold time	Until evenly heated through — soak briefly at temp, then still-air cool
Cool	Still air — no forced cooling
Atmosphere	Neutral

STEP 2 — AUSTENITIZE & HARDEN

Heat treat is driven entirely by the 1084 core. Do not adjust temps for the cladding — copper/bronze/nickel/ wrought are irrelevant to the hardening schedule.

Parameter	Spec
Austenitize temp	1475°F (target)
Soak time	5–10 min at temp
Atmosphere	Controlled kiln
Quench medium	Parks 50 (preferred) or canola — canola acceptable for 1084
Quench technique	Edge-first, straight vertical plunge
Oil temp	100–120°F (warm oil)
Agitate?	Yes — up-and-down motion only for first 10–15 sec. Never figure-8.

No snap temper and no cryo — there is no stainless layer present. The carbon-steel-core rule applies.

STEP 3 — TEMPER

Double-temper is standard. Carbon steel core: 2 hours per cycle, full air cool between cycles.

Parameter	Spec
Cycles	2 cycles (double-temper)

Temper temp — hard	375°F → target HRC 62–64
Temper temp — balanced	400°F → target HRC 60–62
Temper temp — tough	450°F → target HRC 57–59
Hold time	2 hours per cycle (carbon steel core)
Cool between cycles	Full air cool to room temp before second cycle

EXPECTED HARDNESS RESULTS

Temper Temp	1084 Core (HRC)	Cladding / Contrast	Use Case
375°F	62–64	Soft / ductile	Hard use / high edge retention
400°F	60–62	Soft / ductile	Balanced everyday carry
450°F	57–59	Soft / ductile	High toughness / flexible use

FULL PROCESS SUMMARY

#	Step	Temp / Setting	Notes
1	Normalize ×2	1500°F	Still air cool. 2 cycles.
2	Austenitize	1475°F Soak 5–10 min	Even heat throughout billet
3	Quench	Parks 50 or canola 100–120°F	Edge-first, straight plunge. Up-and-down agitation 10–15 sec.
4	Temper ×2	375–450°F 2 hrs each	Full air cool between cycles. No snap temper, no cryo.

WATCH POINTS & COMMON FAILURES

Issue	What to Watch For / Why It Happens
Soft cladding — expected	Copper and nickel layers stay soft after heat treat. This is by design — the 1084 core provides the cutting edge.
Core temp assumption	Heat treat is 100% driven by the 1084 core. Do not adjust temps because copper and nickel is present.
Copper oxidation in quench	Copper and nickel surface may oxidize/darken in oil. Cosmetic only — clean and continue. Does not affect hardness.

POST-HEAT TREAT — ETCHING

AuroraMai's shimmer comes from copper warmth against bright nickel over a dark iron body. Gator Piss Heavy maximizes the contrast.

Product	Use
Gator Piss OG	Etch to bring up the copper warmth and the bright nickel contrast.

Gator Skin	Apply after etch for protection. Locks in contrast and extends finish life.
Grime Reaper	Pre-etch cleaning. Remove all oil, fingerprints, and grinding residue before etching.

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