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Steel Grades and Compositions for Pattern-Welded Blades

Composition in weight percent for the eleven steel grades used in pattern welded blades, split into the dark and the bright series a smith pairs for contrast, plus the two powder metallurgy grades used for pre-damasked billets. Fe is the balance of every row and the values are printed as they appear in the source table.

Reference only. This card is a reference summary of a published table, not an Aobo Steel standard and not a purchase specification. Some of the designations differ from current mill specifications, so confirm chemistry, hardenability and heat treatment against the applicable standard and the material test certificate before ordering.

Grade	C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %	V %	Cu %
1084	0.80	—	0.60	0.040	0.050	—	—	—	—	—
1095	0.9-1.03	—	0.3-0.5	0.040	0.050	—	—	—	—	—
5160	0.560-0.640	0.150-0.3	0.75-1	0.035	0.04	0.7-0.9	—	—	—	—
52100	0.98-1.10	0.15-0.30	0.25-0.45	0.025	0.04	1.30-1.60	—	—	—	—
20C	1.00	0.30	0.45	0.015	0.0005	0.15	—	—	—	—
90MCV8	0.8	—	2	—	—	0.4	—	—	0.10	—
W-2	0.6-1.40	—	—	—	—	—	—	—	0.25	—

Source, Damascus and pattern-welded steels, Forging blades since the iron age (M. Durand-Charre), Table 7.3.1, p. 99 and section 7.5, p. 111.

Bright series, composition in weight percent

Grade	C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %	V %	Cu %
L6	0.7	0.5	—	—	—	—	1.75	0.5	0.25	0.25
15N20	0.75	0.30	0.40	0.018	0.005	0.11	2	—	—	—
45NCD16	0.4	0.5	0.2-0.5	0.03	0.03	1.2	3.8-4.3	0.15-0.35	—	—
ASTM 203 E	0.23	0.15-0.30	0.8	0.035	0.04	—	3.25-3.75	—	—	—

Powder metallurgy grades for damasked billets

Grade	C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %	V %	Cu %
RWL 34	1.05	0.5	0.5	—	—	14	—	4	0.2	—
PMC 27	0.6	0.5	0.5	—	—	13.5	—	—	—	—

Source, Damascus and pattern-welded steels, Forging blades since the iron age (M. Durand-Charre), Table 7.3.1, p. 99 and section 7.5, p. 111.

Notes

- The dark series etches dark in acid and carries most of the carbon of the billet.
- Manganese in the stack stops graphite forming when a forging session runs long, and chromium slows the diffusion of carbon between the layers so the layers stay distinct instead of homogenising into one steel.
- RWL 34 is the harder steel of the pair and finishes bright after etching, PMC 27 is softer and finishes dark. The two together reach about 60 HRC, and the producer reports the beginning of fusion at 1220 °C, so the forging temperature has to be held well below that point.
- Pure nickel and pure iron are also used in the stack for a bright line, but both are soft and are not used for the cutting layer.
- Aobo Steel supplies tool steel in bar and plate form and does not produce pattern welded billets.

Aobo Steel, tool steel supplier

Aobo Steel supplies forged tool steel and engineering steel from Huangshi, Hubei, China, where the local supply chain covers ESR melting, vacuum degassing and LF refining, forging, hot rolling, turned and peeled bar, heat treatment and third party inspection. We have worked in steel since 2003 and supply to order in cold work grades such as D2, D3 and O1, hot work grades such as H10 and H13, stainless grades 420, 440C and 4Cr13, and carbon and alloy bar, with EN 10204 3.1 certification.
Reference data compiled from Damascus and pattern-welded steels, Forging blades since the iron age (Madeleine Durand-Charre), Table 7.3.1 and section 7.5.

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