



Comparison of Tool Steels for use in Machine Knives

The comparison table below is provided to allow our customers a means of choosing between the tool steels they may be using now and what is available from Alcon. It shows relative abrasion resistance between steels that are commonly used in the types of knives made by Alcon Tool and its competitors.

Abrasion resistance and shock resistance are two of the main concerns in any cutting application. Those grades of tool steel at or close to the top have less abrasion resistance, but more shock resistance than those at or near the bottom. If longer tool life is required and chipping or breaking is not occurring, then a grade with more abrasion resistance may be selected. There are many other metallurgical and environmental factors which determine the performance of a tool, but generally this table can be used to determine which grade of steel is best suited for a particular application.

Not all of the grades shown are available in the necessary size and shape, so in practice, the tool must be made from the closest grade available, unless the quantity ordered is large enough to permit a mill order of steel. If the order is large enough to allow a mill order, then almost any grade of tool steel is available in the necessary form.

Abrasion resistance is determined by the carbides that are formed between carbon and the various alloying elements such as: molybdenum, chromium, tungsten and vanadium.

The micro-hardness of these carbides is:

Molybdenum	(MO)	1780
Chromium	(CR)	1820
Tungsten	(W)	2150
Vanadium	(V)	2520

Tool Steel 'AISI =	Analyses						Classification	Working Hardness	Weight loss in grams x 10
	C	MN	CR	W	MO	V			
S-5	.55%	.80%			.40%		Si 2.00%	58	200.0
L-6	.70		.75%				Ni 1.50	60	140.0
52-100	1.00	.35	1.50		.25			63	100.0
O-1	.90	1.35	.50	.50%				62	98.6
O-7	1.25	.75		1.75	.25		² OH tap & reamer steel	64.5	41.0
A-2	1.00	.60	5.00		1.00	.25%	³ AH die steel	63	33.0
D-2	1.50	.35	12.00		.80	.90	High carbon, high chromium	62	9.1
F-2	1.30	.30		3.50			Finishing steel	66	4.7
D-3 D-4	2.20	.40	12.00		1.00		High carbon, high chromium	63	4.3
M-2	.80		4.00	6.00	5.00	2.00	M-2 High Speed	64	3.5
M-3	1.00		4.00	6.00	5.00	2.75	M-3 High Speed	66	2.9
M-4	1.30		4.00	5.50	4.50	4.00	M-4 High Speed	66	2.3
⁴ A-7 MOD.	2.80		8.00		1.00	5.00	Brick mold liner steel	66	1.6
T-15	1.50		4.00	12.00		5.00	CO 5.00% The ultra-ultra high speed	67	1.5

1. AISI: American Iron & Steel Institute

2. OH: Oil Hardening

3. AH: Air Hardening

4. A-7 MOD: This is AISI A-7 modified with extra carbon and alloys to produce the absolute maximum surface abrasion resistance. Not recommended for cutting tools because of coarse grain size.