

# TECHNICAL BULLETIN

## AISI L-6 Oil Hardening Tool Steel Annealed

Typical Analysis:	Carbon 0.75	Mang. 0.75	Chromium 0.90	Moly. 0.35	Nickel 1.75
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Color Code: Red with Green Stripe

### HEAT TREATMENT

**Forging** 2100 to 2175°F, stop at 1700°F, cool slowly

**Normalizing** Do not normalize

**Annealing** 1400°F, furnace-cool, Brinell 217 max

**Hardening** 1500 to 1550°F, oil-quench

**Tempering** 400°F, average hardness, Rockwell C 60/61

### CHARACTERISTICS

**Machinability**—When annealed to a maximum of Brinell 217, L-6 machines with relative ease. It has a rating of 85, as compared with a 1% carbon tool steel rated at 100.

**Dimensional Stability**—L-6 has good safe-hardening and non-deforming properties characteristic of oil-hardening steels. When properly oil quenched, expansion of 0.0015 in./ in. is expected.

**Impact Properties**—L-6 has good impact-resistance when tempered at 400°F or higher. Unnotched Charpy values and Rockwell hardness were obtained from standard specimens heat-treated by quenching in oil from 1525°F and tempered from 300 to 1000°F with the following results in Figure 1.

Tempering Temperature-°F	Rockwell C	Charpy Impact ft-lb
As Quenched	65	6.2
300	62	19.0
400	60	39.9
500	57	80.0
600	55	88.4
700	53	92.5
800	50	102.7
900	46	102.7
1000	43	104.7

FIGURE 1.

**Hardening**—L-6 should be preheated at 1200°F, soaked, then raised to a hardening temperature of 1500 to 1550°F and held for one hour per inch of greatest thickness. Quench in oil to a temperature of 150°F, followed immediately by tempering. Tools made of L-6 in sections less than 1 in. thickness are often air-quenched from 1500°F. Air quenching provides safer hardening of intricate sections. It also results in less distortion than oil quenching.

**Tempering**—L-6 should be tempered at 400°F. However, where increased toughness is desired, at a sacrifice of some hardness, higher tempering temperatures are often used.

To minimize the possibility of cracking, the steel should be tempered immediately after hardening and should be heated slowly to the desired tempering temperature.

Tempering Temperature-°F	Rockwell C	
	1500° Air-Blast	1525° Oil-Quench
No Draw	63	65
300	59.5	62
400	57.5	61
500	56.5	58
600	55	56
700	51	53
800	49	50
900	47.5	48
1000	43.5	46

FIGURE 2.

The results in Figure 2 may be used as a guide in tempering tools to the desired hardness. However, since specimens 7/8 in. in diameter were used in this test, it may be found that tools of heavy section or mass may be several points lower in Rockwell hardness for a given treatment.



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