



INTERNATIONAL TOOL STEEL

The World's Finest Tool Steel

A-2

PRODUCT INFORMATION

TYPICAL PARTS

Used for punches, dies, forming and blanking tools. Provides less distortion in heat treatment when better wear-resistance is necessary.

ADVANTAGES

Low distortion in heat treatment with high abrasion resistance and hardness.

FORGING/ROLLING

Preheat at 1250° F and soak thoroughly. Raise temperature to 2000° F-2050° F and hold until steel is evenly heated. Forging should be stopped at 1700° F. Reheat as often as needed to finish forging process followed by placing in insulated device to avoid any cracking during the cooling process.

ANNEALING

Always anneal after forging process. To prevent decarburization use a controlled atmosphere heating system or pack in a sealed container using inert material. To anneal for the lowest hardness, heat slowly to 1650° F and hold at this temperature for about two (2) hours per in of largest cross section. Cool at a rate of 20 degrees per hour to 1150° F and then reheat to 1350° F. Hold three (3) hours per inch of largest cross section. Furnace cool at 20 degrees per hour to 1100°F, then furnace cool to 900° F and air-cool. A hardness Brinell 212 max with result from this process.

HARDENING

To prevent decarburization, treatment can be carried out in a salt bath or controlled-atmosphere furnace. Pack using inert material. Preheat to 1200° F and hold at this temperature until completely saturated. Heat to 1750° F to 1800° F and hold for one hour per inch of greatest thickness. Air cool after removing from furnace. A-2 is primarily an air-hardening grade, flash oil-quenching is occasionally used on large sections, however it must be removed when 1000° F is reached to be air-cooled to 150° F. Temper immediately to minimize the possibility of cracking.

TEMPERING

After the pieces have cooled in the quench to about 150° F they should be tempered immediately. For most applications, A-2 should be tempered at 350° F to 400° F. A minimum of 2 hours holding time per inch of greatest thickness should be used.

CHEMICAL ANALYSIS A-2	
Carbon	.95/1.05
Phosphorus	.030 Max
Manganese	1.00 Max
Sulfur	.030 Max
Silicon	.50 Max
Chromium	4.75-5.50
Vanadium	.15/.50
Tungsten	___ ___
Molybdenum	1.10
Cobalt	___ ___

TEMPERING	
TEMPERATURE °F	
As-quenched	
400	60
500	56
600	56
700	56
800	56
900	56
1000	45
1100	50
1200	43

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