

## D2 Cold Work Tool Steel Technical Data Sheet

D2 is a high carbon, high chromium, air-hardening tool steel. It was formulated to combine excellent abrasion resistance and air-hardening characteristics. D2 has become the tool and die standard against which other tool steels are measured for abrasion resistance, dimensional stability in hardening, and air-hardening characteristics.

### Typical Chemistry

C	Mn	Mo	Cr	V
1.55	0.40	0.80	11.50	0.90

### Machinability

When properly annealed, D2 has a machinability range of 45 as compared to a 1% carbon steel rated at 100.

### Dimensional Stability

D2 has the minimum distortion in heat treatment as compared to other tool steels. When air quenched from the proper hardening temperature, this grade can be expected to expand or contract approximately .0005 in. per in.

**NOTE:** Distortion (bending, bowing, and twisting) as well as part geometry can add to the variations in movement of a part being hardened.

### Thermal Cycling

In order to avoid decarburization, this grade should be annealed and/or hardened in a controlled neutral atmosphere, vacuum, or neutral salt furnace environment.

**1. Anneal:** Heat to 1560°F. Soak on hour per inch of thickness. Cool 20°F per hour to 1200°F. Cool in furnace to room temperature. Approximate hardness 220 HB max.

**2. Stress Relief of unhardened material:** Heat slowly to 1200-1250°F. Soak for one hour per inch of thickness at heat. Soak. Slow cool (furnace cool if possible) to room temperature.

#### 3. Hardening:

- a) **Preheat:** Heat to 1250°F. Hold this temperature until thoroughly soaked.
- b) **Harden:** Heat to 1850°F. Soak at least 30 minutes for the first inch 15 minutes for each additional inch of thickness.
- c) **Quench:** Circulated air/inert gas or inert gas positive pressure quench down to 150°F.
- d) **Temper:** Double tempering is mandatory, three tempers are sometimes preferred. Soak for an hour per inch of thickness or a minimum of two hours at heat. Air cool to room temperature between tempers. Double temper at the range of secondary hardness (900-860°F) strongly recommended.

See reverse for tempering temperatures.

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Temper°F	Rockwell°C	Temper°F	Rockwell°C
As-quenched	64	800	57
400	60	900/960	58/60
500	58	1000	56
600	58	1100	47

Specimens were air quenched from 1850°F.

The values shown in this data sheet are to be used as a guide for estimating purposes only.

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