

A2 Cold Work Tool Steel Technical Data Sheet

A2 is a 1% carbon, 5% chrome, air-hardening tool steel. A2 is known as a versatile, general purpose grade. A2 has better resistance to abrasion and wear than the 'S' series shock resisting tool steels and more toughness and impact strength than the 'D' series wear steels. A2 is used for a wide range of tooling applications ranging from general purpose punches and dies to components for plastic injection molding.

Typical Chemistry

C	Mn	Mo	Cr	V
1.00	0.60	1.00	5.00	0.20

Machinability

When properly annealed, A2 has a machinability rating of 60 as compared with a 1% carbon steel rated at 100.

Dimensional Stability

When air quenched from the proper hardening temperature, this grade can be expected to expand approximately .001 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

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 one hour per inch of thickness. Cool 20°F per hour to 1200°F. Air cool to room temperature. Approximate annealed hardness 235 HB max.

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

3. Hardening:

- a) **Preheat:** Heat to 1200°F. Hold at this temperature until thoroughly soaked.
- b) **Harden:** Heat to 1720-1790°F. Soak at heat for 20 minutes for the first inch and 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 temper is mandatory. Soak for one hour per inch of thickness or a minimum of two hours at heat. Slow cool to room temperature between tempers.

4. Stress Temper: A stress relief temper for hardened material is strongly recommended after significant grinding, welding, or EDM. Select a temperature that is at least 50°F lower than the lowest tempering temperature used.

See reverse for tempering temperatures.

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Temper°F	Rockwell°C	Temper°F	Rockwell°C
As-quenched	64	900	56
400	60	1000	55
500	58	1100	50
600	57	1200	39
800	56		

Specimens 1"Ø were quenched from 1775°F.

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



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