



NESSteel Inc.

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Tool, Mold & Die Steel AISI A-6

A-6 is an air-hardening die steel with excellent non-deforming properties. Typical analysis is shown in the chart below:

Carbon	Silicon	Manganese	Chromium	Molybdenum
1%	0.2%	0.6%	5.3%	1.1%

A-6 is used in applications requiring wear resistance and toughness, and where distortion in heat treatment must be minimized. Typical applications are:

- Blanking Dies
- Thread Roll Dies
- Coining Dies
- Drawing Dies
- Forming Dies
- Shear Blades
- Plastic Molds
- Precision Tools
- Gauges

Heat Treatment

Forging:

- Heat slowly to 2025° F.
- Allow steel to heat through before forging.
- DO NOT hot work A-6 below 1650° F.
- After forging, allow A-6 to cool slowly in furnace or buried in ashes, lime, etc.
- Anneal as soon as possible.

Annealing:

- Slowly heat A-6 to 1350° - 1400° until piece is uniformly heated through.
- Cool slowly in furnace at 20°/hour to 1000°F, and then air cool to room temperature.
- Annealed hardness ranges between 200 - 230 Brinell.

Stress Relieving:

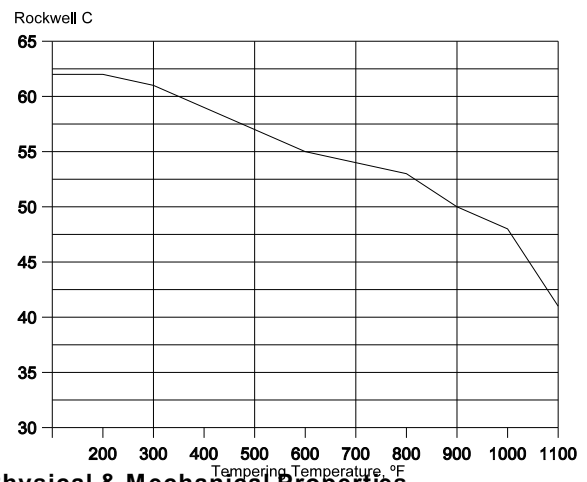
Heat slowly to 1150°F - 1250°F, hold at least one hour per inch of maximum dimension, cool in still air.

Hardening:

- Surface protection: pack hardening or controlled atmosphere furnaces.
- Pre-heat slowly to 1200°F, then increase heat to hardening temperature of 1525°F-1600°F.
- Hold steel at hardening temperature for 1 hour, cool in still air, temper when piece has reached 150°F.
- As-hardened hardness should be about 60 - 63 Rockwell C, depending on piece size.

Tempering

- Temper immediately after hardening
- Best combination of toughness and hardness is achieved at tempering temperatures between 350°F - 400°F, with Rockwell C between 50 - 60.
- Heat slowly to temperature.
- Hold tools at temperature for 1 hour per inch of cross section (minimum 2 hours).
- Cool slowly to room temperature.



Physical & Mechanical Properties

- Density, lb per cu in: .290
- Specific gravity 7.85

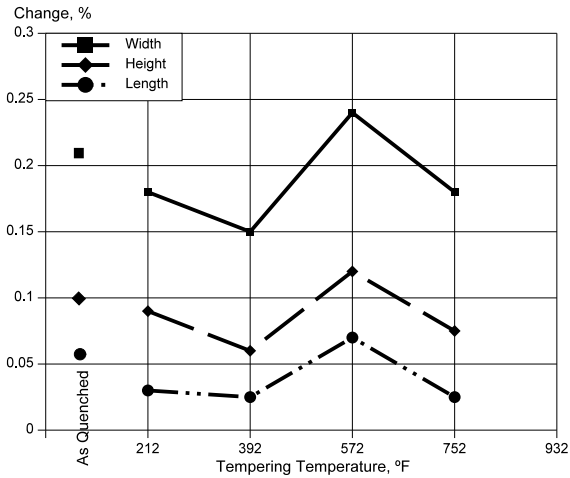
EDM

EDMing produces a recast (melted and rehardened) layer on the steel. EDM'd pieces should be retempered at 50°F under the final tempering temperature to prevent cracking due to stress caused by the recast layer, and stoned to remove recast layer.

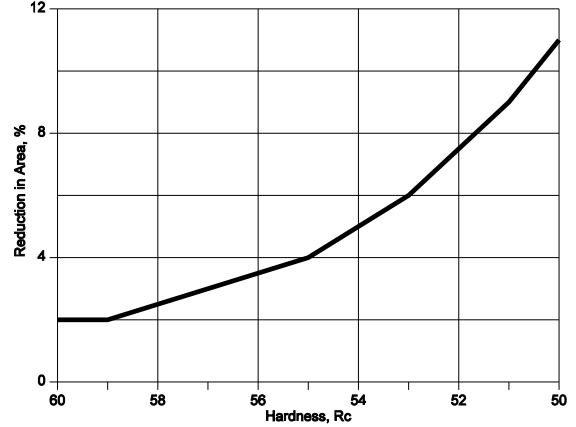
Mean Thermal Coefficient of Expansion

Range °F	Coefficient x 10 ⁻⁶ in./in./°F
68-212	6.57
68-392	6.91
68-572	7.32
68-752	7.59
68-932	7.86
68-1112	8.01
68-1292	8.19

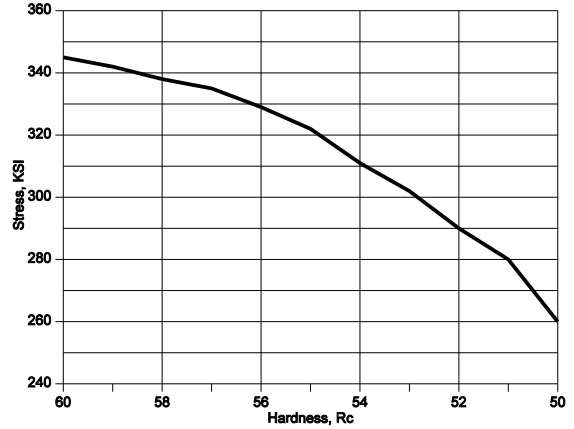
Size Change in Heat Treatment



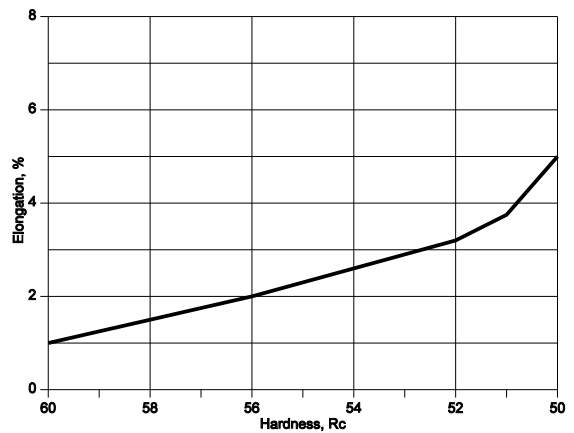
Typical Mechanical Properties



Ultimate Strength



Elongation



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