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AISI A6

Air Hardening Die Steel

A6 is an air hardening, cold work die steel which exhibits less distortion during heat treatment than water or oil hardening steels and most high alloy, air hardening die steels. It is a fully air hardening steel, a 6 inch cube hardening to Rockwell C 60 in still air. In addition, A6 has the advantage of a low hardening temperature range, 1500'-1600F, usually available only in oil hardening steels.

The minimum distortion characteristic of A6 makes it particularly attractive for dies and punches in blanking and forming operations, for gages, or for other tools where close size tolerance is important.

Typical Analysis

Carbon .70	Chromium 1.00
Manganese 2.00	Molybdenum 1.35
Silicon .30	Sulfur .09

Annealing

A6 may be annealed in either a controlled atmospheric furnace or packed in spent pitch coke, spent cast iron chips, or in lime, fine dry ashes, sand, or ground mica with approximately 10 percent burned charcoal added. Heat to 1325- 1375°F and hold approximately 4 hours for each inch of thickness. Cool very slowly at a rate of 20' per hour to approximately 1000°F. Annealed hardness range is normally 235 to 245 Brinell.

Hardening

The hardening temperature range for A6 is from 1500'-1600°F. Tools with simple shapes may be heated directly to the hardening temperature from room temperature. A preheat of 1200-1250°F should be used for tools or intricate shapes. A furnace atmosphere for hardening should be slightly oxidizing. Cool in still air or an air blast.

Tempering

To obtain high hardness with minimum distortion, A6 should be tempered at temperatures between 300-400°F. Tempering time will vary with the size of the piece being hardened, but even the smallest tools should be tempered for a minimum of 1 hour. Reference to the hardening and tempering table will give approximate hardness obtained with various tempering temperatures.

Hardening	Air Cooled	Shepherd	Tempering	
Temp.	Hardness	Fracture	Temp.	Hardness
°F	Rockwell C	Rating	Rating	Rockwell C
1400	56	9	300	54
			400	54
			500	51.5
			600	51
			700	49
			800	47
			900	44
			1000	41
1450	60.5	9	300	60
			400	58.5
			500	57
			600	56
			700	54
			800	49.5
			900	47
			1000	43
1500	61.5	9	300	60.5
			400	59
			500	56
			600	55
			700	53
			800	50
			900	48
			1000	44
1550	62	9	300	60.5
			400	59
			500	56
			600	56
			700	54
			800	51
			900	48.5
			1000	45
1600	63	9	300	61
			400	59
			500	57
			600	56.5
			700	54.5
			800	52.5
			900	50
			1000	46
1650	60	8.5	300	57
			400	56
			500	56
			600	56
			700	55.5
			800	52.5
			900	51
			1000	46