HEAT TREATMENT OF M-SHAPED DIES

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For hardening of M-shaped dies with a section of 22 × 57 mm which are made of Kh12M steel two heating furnaces are used. Preliminary heating to 800°C is conducted in the first, and final heating to 1020-1040°C in the second. Spindle oil is used as the cooling medium. Tempering is conducted at 200-400°C. The hardness is HRC 58-62. The soaking time during tempering is 30-40 min, depending on the size of the die.

Hardening of Die Cores

Cores for dies made of low-carbon steel are case hardened, quenched, and tempered. Initial heating is carried out in tempering apparatus with rotation of the pieces and movement in the direction of the axis. In such a treatment striped hardening (spirally) is carried out. According to the innovators, V. G. Vinogradov and G. N. Dyukov, the cores of steels 45-50 are simultaneously heated along the entire working length in the multiturn inductor.

For accurate alignment of the pieces and prevention of sticking in the inductor the pieces are placed on several layers of sheet asbestos. For simultaneous heating the core is moved about its axis during heating. The base is hardened after heat treatment of the working part of the core.

The cores are heat treated in the LZ-67V apparatus. The inductor is made of pure copper with a tubular section of 8 × 1. The cores are heated throughout the length of the surface being worked.

Technical Characteristics

Thickness of hardened layer, mm	2-3
Multiturn inductor:	
Number of loops	11
inside diameter, mm	40
length of inductor, mm	110
Heat treatment:	
Frequency, cps	60-74
Anodic voltage, kV	10
Anodic current, A	7.2-7.5
Grid current, A	1.5
Voltage on the contour, kV	7-8
Heating time of cores, sec:	
One bunch	10
two-three bunches	13
Control of temperature of 850-890°C	Visual
Hardness attained for steel 45	HRC 58-62

The depth of hardening was controlled by checking samples from 100-200 pieces. Low-temperature tempering under the previous conditions was used (150-170°C, 1-1.5 h, electric furnace). On final acceptance by OTK after this treatment the hardness was below HRC 58; the hardness of the head was at least HRC 45.

As the result of the adoption of the new method case hardening has been eliminated, the treatment time shortened, the labor input reduced, and the cost of the material and the expenditure of electrical energy reduced.

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