



## PERFO HOT CO - Hot Work Tool Steels

### General Information

Perfo Hot Co is a hot worked tool steel that contains Chromium - Tungsten, cobalt and reinforced with Vanadium. At high temperatures, it reseves its hardness and also it has excellent shock and abrasion resistance.

### Chemical Composition

C %	Cr %	W %	V %	Co%	
0.40	4.25	4.25	2.00	4.25	

### Typical Applications :

- Extrusion moulds
- Grinding plates
- Extrusion moulds connection points
- Forged moulds connections points
- Model blocks
- Mandrels

### Physical Properties

Critical Temperature - (heating) 855°C

Specific density - 7.96

Thermal expansion coefficient

38 - 427°C 10.98 x 10<sup>-6</sup>/°C

38 - 538°C 11.81 x 10<sup>-6</sup>/°C

38 - 649°C 12.29 x 10<sup>-6</sup>/°C

### Forging

For forging, heating process must be done slowly and homogeneously. Material is dwelling at 1037-1093°C and if needed, it heats again and when the temperature is below 898°C, process must be stopped. After forging, cooling process is performed slowly on limestone, mica, dry ash or in furnace. Perfo Hot Co must be annealed after forging.

### Annealing

Metal is heated slowly until 843-871°C, and it must be dwelled until all the body heated and it is cooled slowly until 537°C with a rate 4.4°C/h. After this process, cooling rate can be increased. To avoid the carburization or decarburization, certain precautions must be applied.

### Stress Relieving

During the process, if it is necessary to apply stress relieving, metal is heated until 566-677°C, dwelled at these temperature rage to stabilize, then cooled on air.

### Preheating for hardening

Before hardening, preheating is recommended in the furnace at 760-815°C.

### Hardening

After preheating, metal is transfered to hardening furnace, the process takes place at 1148-1204°C according to the desired hardness value and mould size. Salt baths and controlled atmosphere furnaces are highly recommended to minimize the the carbon content change on the surface. In hardening process, long dwelling time causes grain growth for that reason it is not recommended.

### Quenching

Quenching takes place at 537-593°C with using air, oil and molten salt medium. In case of oil quenching, when part loses its color (at the range of 537-648°C), quenching should be stopped and continue with air cooling. Cooling must be continued until 65.5°C or parts can be handled, then immediately tempered.

### Tempering

#### Double Tempering

427°C	57.0 RC
482°C	58.1
510°C	58.4
538°C	58.2
566°C	56.0
593°C	53.2
621°C	50.0
649°C	46.9
677°C	43.7
704°C	40.0

#### Oil quenching from 1190.5°C