



**Hot Working  
Tool Steel**

**PREMIUM  
GRADE  
TGGP13**



Smelting method : EAF+LF+VD+ESR

Main characteristics : High ductility, high thermal fatigue resistance, high thermal erosion resistance, high isotropic property, high purity and small heat treatment distortion.

Major applications : • Long-life Al, Mg and Zn alloy pressure casting molds, for example: automobile engine cylinder body, cylinder cover, gearbox shell molds. • Large-scale hot extrusion molds: for example, aluminium alloy extrusion molds for high-speed rails and metros. • Precise hot forging molds: for example, automobile engine crankshaft and connecting rod molds; gear molds of gear boxes.

Equivalent Grade from UDDEHOLM / ORVAR SUPREME

Chemical constituent (%):

C	Si	Mn	Cr	Mo	V	P	S
0.39	1.1	0.4	5.3	1.45	1.0	≤0.009	≤0.001

Physical Property :

Room temperature density (Kg/m <sup>3</sup> )	Specific heat of room temperature (J/Kg.K)	200°C thermal conductivity (W/m.K)	Elastic modulus (N/mm <sup>2</sup> )	Linear expansivity (x10 <sup>-6</sup> K)	
				20 ~ 200°C	20 ~ 400°C
7.80	430	22	215000	11.3	11.9

Ultrasonic flaw detection: As per SEP1921: E/e flaw detection or GB/T4162 Class AA flaw detection, i.e., flat bottom hole ≤φ 1mm, no flaw detection noise wave shall appear or please comply with customer regulation.

Purity :

Class A		Class B		Class C		Class D	
Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse
0.5	0.	1.0	0.5	0.5	0	1.0	0.5

Delivery state : (1) Delivery hardness: delivery under annealing state, delivery hardness ≤ 229HB; (2) Organization state and impact power requirement: the organization and segregation shall comply with North American Die Casting Association No. 207 criterion; (3) Impact power sample: please sample according to the central part of steel. The samples shall be treated according to criterions in North American Die Casting Association, making sure that hardness of samples at 45±2HRC. Dimension of sample: 7\*10\*55. Gapless.

Specification (diameter, thickness mm)	Average impact power at the center part not less than (J)	Minimum impact power per sample not less than (J)
>60-300	300	250
>300	300	200

Supply specification

Product Name	Specification/mm	Material
Forged round bar	φ 71-810	TGGP13
Forged module	(120-400) x (300-800)	TGGP13
Rolled round bar	φ 14.5-70	TGGP13
Rolled flat bar	(12-120) x (200-810)	TGGP13

Thermal treatment

Softening annealing	Quenching	Tempering
Heating to 850°C for heat insulation; cooling to 600°C at 10°C/h air cooling	1020-1040°C quenching; high-speed gas quenching or hot oil cooling	Selecting tempering temperature according to hardness requirements; please conduct tempering for 3 times; prevent tempering under 425-550°C

