

Ferro-Tic Grade SK

GRADE DESCRIPTION

Ferro-Tic Grade SK is an advanced metal matrix composite comprised of ultra-hard titanium carbide grains homogeneously dispersed in a modified hot work, chromium tool steel matrix. In the annealed state, it can be readily machined into any desired shape using conventional tooling. SK is formulated to provide a combination of wear resistance, toughness and good thermal shock resistance.



APPLICATIONS

Ferro-Tic Grade SK is used in tooling applications where impact is encountered, or in hot work applications where thermal cycling is an issue. Specific applications include cold and hot heading dies, swaging dies, mandrels, hot work rolls, etc. SK is an excellent knife material especially in the plastics and packaging industries.

CHEMICAL COMPOSITION GUIDE (weight %)

Carbide Phase	Binder Phase				
	Cr	Mo	Ni	C	Fe
Titanium Carbide	5.0	4.0	0.5	0.4	Bal
25.0					

PROPERTIES

Density, g/cc.....6.80
Hardness, Rc
Annealed.....35-42
Hardened and Tempered
400°F Single Temper.....63-68
800°F Double Temper.....60-65
Transverse Rupture Strength.....225
(psi x 103)
Compressive Strength.....381
(psi x 103)
Impact Strength.....422
(Charpy unnotched) (in-lbs/in²)
Tensile Strength.....145
(psi x 103)
Modulus of Elasticity, Mpsi45
Coefficient of Thermal Expansion x 10⁻⁶ in/in/°F
70°F-200°F.....4.41
70°F-975°F.....5.89
Linear Size Change
Thru Heat Treatment, %.....+0.034
Thermal Shock Resistance.....100 cycles
(Heat to 1830°F, oil quench, repeat until crack appears)

ANNEALING

Use a slightly carburizing atmosphere or stainless steel envelope for protection.
Heat to 1550°F, hold for 3 hours
Cool to 1350°F, hold for 8 hours
Furnace cool to below 1200°F,
air cool Hardness 35 – 42 HRC
(material is supplied in the annealed condition)

HARDENING

Austenitizing Temperature:

1875°F Holding Time: 1 Hour per inch of thickness
(minimum 30 minutes)

Austenitizing Method:

Protective Foil Envelope

Type 321 Stainless Steel Foil
.003 minimum thickness
Edges double crimped to prevent leakage

Air Quench:

Parts in protective envelope – start air flow (fan) over a heat sink plate, remove pieces from envelope immediately after removing envelope from furnace, place pieces on heat sink

Vacuum Furnace

Vacuum of 10 to 50 microns
Vacuum Quench: Positive pressure quench
(2 bar minimum) to below 125°F

Tempering:

Should be done as soon as quenched parts reach room temperature.
Cold Work: Temper at 400°F, hold for 1 hour, cool to room temperature
Hardness 63 – 68 HRC
Hot Work: Double temper at 800°F, hold for 1 hour, cool to room temperature
Hardness 60 - 65 HRC