

# Ferro-Tic Grade C

## GRADE DESCRIPTION

Ferro-Tic Grade C is an advanced metal matrix composite comprised of ultra-hard titanium carbide grains homogeneously dispersed in a heat-treatable tool steel matrix. In the annealed state, it can be readily machined into any desired shape using conventional tooling. Grade C is used where ambient or working temperatures do not exceed 375°F.



## APPLICATIONS

Ferro-Tic Grade C has been used effectively for all types of punching, stamping and piercing operations. Due to its ease of fabrication, high hardness and dimensional stability, Grade C is an excellent material for gage components. It has also been successfully used in cryogenic environments.

## CHEMICAL COMPOSITION GUIDE (weight %)

Carbide Phase	Binder Phase			
Titanium Carbide	Cr	Mo	C	Fe
33.0	3.0	3.0	0.62	Bal

## PROPERTIES

Density, g/cc.....6.60  
Hardness, Rc  
Annealed.....44-52  
Hardened and Tempered .....68-71  
Transverse Rupture Strength.....216  
(psi x 103)  
Compressive Strength.....520  
(psi x 103)  
Impact Strength.....323  
(charpy unnotched) (in-lbs/in<sup>2</sup>)  
Tensile Strength.....190  
(psi x 103)  
Modulus of Elasticity, Mpsi .....42  
Coefficient of Thermal Expansion x 10<sup>-6</sup> in/in/°F  
70°F-375°F.....1.96  
Linear Size Change  
Thru Heat Treatment, %.....+0.048

## 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 44 - 52 HRC  
(Material is supplied in the annealed condition.)

## HARDENING

### Austenitizing Temperature:

1750°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

### Tempering:

Should be done as soon as quenched parts reach 125°F  
Hold parts for 1 hour at 375°F,  
Air cool Hardness 68 -71 HRC