

## Kennametal Stellite Stellite® 21

Category : Metal , Nonferrous Metal , Cobalt Alloy , Superalloy

### Material Notes:

Excellent high temperature strength, high toughness. Solution treat at 1191-1204°C, rapid air cool, age between 538-871°C to increase hardness and strength at the expense of impact and ductility. Applications: turbine blades and vanes, hot die applications, components in combustion or exhaust systems where high strength to 816°C and oxidation to 1093°C is required, used as medical and dental components as well as remelt stock. Corrosion: Excellent resistance to body fluids and has been used for medical implants, dental fixtures, and surgical equipment. Good resistance to cavitation corrosion. Machinability: best in solution treated condition. Carbide tipped tools and low speeds and feeds should be used to avoid work hardening. Lubrication is normally used. Wear: Excellent galling resistance when self-mated or mated with Stellite alloy-6. Resistance to cavitation erosion nearly as good as Stellite alloy 6 and as good or better at high loads. Lower carbon content makes it inferior to Stellite alloy 6 for low stress abrasion resistance. Data provided by the manufacturer, Deloro Stellite Inc. Product of former Deloro Stellite Inc. Similar to Vitallium, ASTM F75, HS21

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Physical Properties	Metric	English	Comments
Density	8.31 g/cc	0.300 lb/in <sup>3</sup>	

Mechanical Properties	Metric	English	Comments
Hardness, Brinell	237	237	
	101	101	
	@Temperature 871 °C	@Temperature 1600 °F	
	137	137	
	@Temperature 649 °C	@Temperature 1200 °F	
Hardness, Knoop	143	143	
	@Temperature 538 °C	@Temperature 1000 °F	
Hardness, Rockwell A	148	148	
	@Temperature 427 °C	@Temperature 800 °F	
Hardness, Knoop	278	278	Converted from Brinell hardness.
Hardness, Rockwell A	64	64	Converted from Rockwell C hardness. Beyond normal Rockwell B range, for comparison only.
Hardness, Rockwell B	103	103	Converted from Rockwell C hardness.
Hardness, Rockwell C	22 - 32	22 - 32	

Mechanical Properties <i>Hardness, Vickers</i>	Metric <i>24.4</i>	English <i>24.4</i>	Comments <i>Converted from Brinell hardness.</i>
Tensile Strength, Ultimate	724 MPa	105000 psi	
Tensile Strength, Yield	517 MPa	75000 psi	
Elongation at Break	9.0 %	9.0 %	
Modulus of Elasticity	248 GPa	36000 ksi	
Compressive Yield Strength	1359 MPa	197100 psi	
Charpy Impact	13.6 J	10.0 ft-lb	V-Notch

Thermal Properties	Metric	English	Comments
CTE, linear	14.1 $\mu\text{m/m}\cdot\text{Å}^\circ\text{C}$	7.83 $\mu\text{in/in}\cdot\text{Å}^\circ\text{F}$	
	@ Temperature 20.0 - 315 $\text{Å}^\circ\text{C}$	@ Temperature 68.0 - 599 $\text{Å}^\circ\text{F}$	
	14.3 $\mu\text{m/m}\cdot\text{Å}^\circ\text{C}$	7.94 $\mu\text{in/in}\cdot\text{Å}^\circ\text{F}$	
	@ Temperature 20.0 - 427 $\text{Å}^\circ\text{C}$	@ Temperature 68.0 - 801 $\text{Å}^\circ\text{F}$	
	14.7 $\mu\text{m/m}\cdot\text{Å}^\circ\text{C}$	8.17 $\mu\text{in/in}\cdot\text{Å}^\circ\text{F}$	
	@ Temperature 20.0 - 538 $\text{Å}^\circ\text{C}$	@ Temperature 68.0 - 1000 $\text{Å}^\circ\text{F}$	
Thermal Conductivity	15.1 $\mu\text{m/m}\cdot\text{Å}^\circ\text{C}$	8.39 $\mu\text{in/in}\cdot\text{Å}^\circ\text{F}$	
	@ Temperature 20.0 - 649 $\text{Å}^\circ\text{C}$	@ Temperature 68.0 - 1200 $\text{Å}^\circ\text{F}$	
	15.6 $\mu\text{m/m}\cdot\text{Å}^\circ\text{C}$	8.67 $\mu\text{in/in}\cdot\text{Å}^\circ\text{F}$	
	@ Temperature 20.0 - 816 $\text{Å}^\circ\text{C}$	@ Temperature 68.0 - 1500 $\text{Å}^\circ\text{F}$	
	14.7 W/m-K	102 BTU-in/hr-ft $\text{Å}^2\cdot\text{Å}^\circ\text{F}$	
	Melting Point	1338 - 1366 $\text{Å}^\circ\text{C}$	2440 - 2491 $\text{Å}^\circ\text{F}$
Solidus	1338 $\text{Å}^\circ\text{C}$	2440 $\text{Å}^\circ\text{F}$	
Liquidus	1366 $\text{Å}^\circ\text{C}$	2491 $\text{Å}^\circ\text{F}$	

Component Elements Properties	Metric	English	Comments
Boron, B	$\leq 0.0070 \%$	$\leq 0.0070 \%$	
Carbon, C	0.25 %	0.25 %	
Chromium, Cr	27 %	27 %	

Component Elements Properties Cobalt, Co	Metric 02.25 %	English 02.25 %	Comments As remainder
Iron, Fe	1.5 %	1.5 %	
Molybdenum, Mo	5.5 %	5.5 %	
Nickel, Ni	2.75 %	2.75 %	
Silicon, Si	0.75 %	0.75 %	

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