

Kennametal Stellite Nucalloy® 453 High-Silicon Nickel-Base Hardfacing Alloy

Category : Metal , Nonferrous Metal , Nickel Alloy , Superalloy

Material Notes:

Applications include chemical control valves, nuclear globe valves, nuclear gate valves, nuclear sliding parts, and pressure bars for plywood cutters. Nucalloy® alloys are unique, patented, high-silicon, nickel-base hardfacing alloys that are designed to have optimum combinations of hardness and toughness, similar to the cobalt base alloys. Because of the unique microstructure features, they are less crack sensitive than the conventional nickel-base hardfacing alloys, such as, NiCr-A and NiCr-B, during welding. The Nucalloy alloys have a matrix consisting of, essentially, nickel solid solution, a binary eutectic and ternary eutectic. The binary eutectic is composed of nickel solid solution and nickel silicide (Ni₃Si); whereas the ternary eutectic consists of nickel solid solution, nickel boride (Ni₃B) and nickel silicide (Ni₃Si). There are also carbide and boride particles dispersed in the matrix. The microstructures of these alloys differ from those of the conventional self-fluxing nickel alloys in that the brittle binary eutectic of nickel solid solution and nickel boride does not form because of the intentionally controlled high silicon to boron ratios. The high silicon and low boron in these alloys results in high fractions of nickel silicide, which is resistant to certain corrosive media due to the tendency to form a high-silicon film on the surface. Information provided by Deloro Stellite Inc. Product of former Deloro Stellite Inc.

Order this product through the following link:

http://www.lookpolymers.com/polymer_Kennametal-Stellite-Nucalloy-453-High-Silicon-Nickel-Base-Hardfacing-Alloy.php

| Physical Properties | Metric | English | Comments |
|---------------------|-----------|--------------------------|----------|
| Density | 8.10 g/cc | 0.293 lb/in ³ | |

| Mechanical Properties | Metric | English | Comments |
|----------------------------|----------------------|-----------------------|----------|
| Hardness, Rockwell C | 43 | 43 | |
| Hardness, Vickers | 463 | 463 | |
| | 328 | 328 | |
| | @Temperature 700 Â°C | @Temperature 1290 Â°F | |
| | 391 | 391 | |
| | @Temperature 600 Â°C | @Temperature 1110 Â°F | |
| | 401 | 401 | |
| | @Temperature 500 Â°C | @Temperature 932 Â°F | |
| | 421 | 421 | |
| | @Temperature 400 Â°C | @Temperature 752 Â°F | |
| Tensile Strength, Ultimate | 958 MPa | 139000 psi | |
| | 883 MPa | 128000 psi | |

| Mechanical Properties | Metric | English | Comments |
|-------------------------|-----------------------|-----------------------|----------|
| | 896 MPa | 130000 psi | |
| | @Temperature 600 Â°C | @Temperature 1110 Â°F | |
| | @Temperature 400 Â°C | @Temperature 752 Â°F | |
| Charpy Impact Unnotched | 10.0 J/cmÂ² | 47.6 ft-lb/inÂ² | |
| | @Temperature 20.0 Â°C | @Temperature 68.0 Â°F | |
| | 11.0 J/cmÂ² | 52.4 ft-lb/inÂ² | |
| | @Temperature 400 Â°C | @Temperature 752 Â°F | |
| | 11.0 J/cmÂ² | 52.4 ft-lb/inÂ² | |
| | @Temperature 600 Â°C | @Temperature 1110 Â°F | |

| Thermal Properties | Metric | English | Comments |
|--------------------|-----------------------------|------------------------------|----------|
| CTE, linear | 11.0 Âµm/m-Â°C | 6.11 Âµin/in-Â°F | |
| | @Temperature 20.0 - 100 Â°C | @Temperature 68.0 - 212 Â°F | |
| | 11.7 Âµm/m-Â°C | 6.50 Âµin/in-Â°F | |
| | @Temperature 20.0 - 200 Â°C | @Temperature 68.0 - 392 Â°F | |
| | 12.0 Âµm/m-Â°C | 6.67 Âµin/in-Â°F | |
| | @Temperature 20.0 - 300 Â°C | @Temperature 68.0 - 572 Â°F | |
| | 12.4 Âµm/m-Â°C | 6.89 Âµin/in-Â°F | |
| | @Temperature 20.0 - 500 Â°C | @Temperature 68.0 - 932 Â°F | |
| | 12.4 Âµm/m-Â°C | 6.89 Âµin/in-Â°F | |
| | @Temperature 20.0 - 400 Â°C | @Temperature 68.0 - 752 Â°F | |
| | 12.9 Âµm/m-Â°C | 7.17 Âµin/in-Â°F | |
| | @Temperature 20.0 - 600 Â°C | @Temperature 68.0 - 1110 Â°F | |
| Melting Point | 980 - 1240 Â°C | 1800 - 2260 Â°F | |
| Solidus | 980 Â°C | 1800 Â°F | |
| Liquidus | 1240 Â°C | 2260 Â°F | |

| Component Elements Properties | Metric | English | Comments |
|-------------------------------|--------|---------|--------------|
| Boron, B | 0.50 % | 0.50 % | |
| Carbon, C | 0.85 % | 0.85 % | |
| Chromium, Cr | 10 % | 10 % | |
| Iron, Fe | 3.0 % | 3.0 % | |
| Nickel, Ni | 78 % | 78 % | As Remainder |
| Silicon, Si | 5.3 % | 5.3 % | |
| Tungsten, W | 2.0 % | 2.0 % | |

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