

ATI NiTi Alloys

| Table 1. Ingot Chemistry | | | | | |
|----------------------------|----------------------------|-------------|--------------|---------------|-------------------|
| A _f Temperature | NiTi SEA 1™ | NiTi SEA 2™ | NiTi SMA 1™ | NiTi SMA 2™ | ASTM F2063 limits |
| | -30°C to 0°C | 0°C to 30°C | 30°C to 75°C | 75°C to 120°C | |
| Element | Typical maximum (weight %) | | | | |
| Nickel | 56.0 | 55.7 | 54.0 to 57.0 | 53.0 to 56.0 | 54.5 to 57.0 |
| Carbon | 0.005 | 0.005 | 0.005 | 0.005 | 0.050 |
| Cobalt | 0.005 | 0.005 | 0.005 | 0.005 | 0.050 |
| Copper | 0.005 | 0.005 | 0.005 | 0.005 | 0.010 |
| Chromium | 0.005 | 0.005 | 0.005 | 0.005 | 0.010 |
| Hydrogen | 0.002 | 0.002 | 0.002 | 0.002 | 0.005 |
| Iron | 0.005 | 0.005 | 0.005 | 0.005 | 0.050 |
| Niobium | 0.005 | 0.005 | 0.005 | 0.005 | 0.025 |
| Nitrogen + Oxygen | 0.025 | 0.025 | 0.025 | 0.025 | 0.050 |
| Titanium | Balance | Balance | Balance | Balance | Balance |

| Table 2. Microcleanliness (Non-metallic inclusions/porosity) | | | | | |
|--|-------------|-------------|-------------|-------------|-------------------|
| Typical maximum | NiTi SEA 1™ | NiTi SEA 2™ | NiTi SMA 1™ | NiTi SMA 2™ | ASTM F2063 Limits |
| Area fraction (%) | 1.5 | 1.5 | NA | NA | ≤ 2.8 |
| Size(μm) | 35.0 | 35.0 | NA | NA | ≤ 39.0 |

| Table 3. Physical Properties | |
|------------------------------|---|
| Melting Point | 1310°C (2390°F) |
| Density | 6.45 g/cm ³ (0.234 lbs/in ³) |
| Electrical Resistivity | Austenite phase: ~80-100 μΩ-cm Martensite phase: ~70-80 μΩ-cm |
| Thermal Conductivity | Austenite phase: 0.18 watt/cm-°C Martensite phase: 0.085 watt/cm-°C |
| Thermal Expansion | Austenite: 11 x 10 ⁻⁶ /°C Martensite: ~6.6 x 10 ⁻⁶ /°C |

Resource for additional physical properties:

- ASM Materials Properties Handbook: Titanium Alloys, ASM International Copy Right 1994

MECHANICAL PROPERTIES

| Table 4. Mechanical Properties | |
|--------------------------------|---------------------|
| Ultimate strength | >155 Ksi (1070 MPa) |
| Elongation | ≥10% |

(Yield strength and modulus depend on final product condition and testing conditions)