WGB Industries Inc.

ALLOY 319.1

319.1 is widely used in the automotive, aerospace and equipment manufacturing industry, due to its excellent casting properties and good combination of mechanical properties. The alloy has good castability, weldability and pressure tightness along with resistance to hot cracking. 319.1 also as the ability to be cast into complex shapes, has good corrosion resistance, and its balance of strength and weight make it ideal for many of the following applications. Machining characteristics are good, however, carbide-tipped tools are recommended.

APPLICATIONS

- Engine components
- Cylinder heads
- Engine blocks
- Intake manifolds
- Pistons
- Machine guards
- Compressor housings
- Transmission cases
- Gear housings
- Motor Housings
- Structural components
- Bracket mounts
- Control arms
- Pump housings
- Valve bodies

Chemical Composition Limit by weight %

- Silicon (Si): 5.5 - 6.5
- Iron (Fe): 1.0 max
- Copper (Cu): 3.0 - 4.0
- Manganese (Mn): 0.1 - 0.5
- Magnesium (Mg): 0.1 max
- Nickel (Ni): 0.5 max
- Zinc (Zn): 1.0 max
- Lead (Pb): 0.2 max
- Tin (Sn): 0.1 max
- Titanium (Ti): 0.25 max
- Chromium (Cr): 0.1 max
- Other elements, each: 0.05 max
- Other elements, total: 0.15 max
- Aluminum (Al): Balance

Mechanical Properties

The mechanical properties of 319.1 can vary based on the temper or heat treatment condition. Here are the typical properties for the as-cast, T5 and T6 conditions:

- **As-Cast (F)**
- Tensile Strength: 160 - 220 MPa (23 - 32 ksi)
- Yield Strength: 105 - 155 MPa (15 - 22 ksi)
- Elongation: 1 - 3%

- **Heat Treated (T5)**
- Tensile Strength: 240 - 290 MPa (35 - 42 ksi)
- Yield Strength: 180 - 230 MPa (26 - 33 ksi)
- Elongation: 2 - 4%

- **Heat-Treated (T6)**
- Tensile Strength: 260 - 310 MPa (38 - 45 ksi)
- Yield Strength: 210 - 260 MPa (30 - 38 ksi)
- Elongation: 2 - 4%