

# C93200

## Chemical Composition

(%max., unless shown as range or min.)

|           | Cu <sup>(1)</sup> | Al   | Sb  | Fe  | Pb      | Ni <sup>(2)</sup> | P <sup>(3)</sup> | Si   | S   | Sn      | Zn      |
|-----------|-------------------|------|-----|-----|---------|-------------------|------------------|------|-----|---------|---------|
| Min./Max. | 81.0-85.0         | .005 | .35 | .20 | 6.0-8.0 | 1.0               | .15              | .005 | .08 | 6.3-7.5 | 1.0-4.0 |
| Nominal   | 83.0              | -    | -   | -   | 7.0     | -                 | -                | -    | -   | 6.9     | 2.5     |

(1) In determining Cu min., Cu may be calculated as Cu + Ni.

(2) Ni value includes Co.

(3) For continuous castings, P shall be 1.5%, max.

Note: Cu + Sum of Named Elements, 99.0% min.

## Mechanical Properties (measured at room temperature, 68 F (20 C))

| Temper                     | Section Size | Cold Work | Typ/Temp | Tensile Strength       |               | Yield Strength | Yield Strength | E <sub>l</sub> | Rockwell Hardness | Vickers Hard. | Brinell Hard. | Shear Strength | Fatigue Strength* | Izod Impact Strength |
|----------------------------|--------------|-----------|----------|------------------------|---------------|----------------|----------------|----------------|-------------------|---------------|---------------|----------------|-------------------|----------------------|
|                            |              |           |          | (0.5% ext. under load) | (0.2% offset) | (0.05% offset) | % B            |                | C                 | F             | 30T           | 500            | 500               | 3000                 |
|                            | in.          | %         | F        | ksi                    | ksi           | ksi            | ksi            |                |                   |               |               | ksi            | ksi               | ft-lb                |
|                            | mm.          |           | C        | MPa                    | MPa           | MPa            | MPa            |                |                   |               |               | MPa            | MPa               | J                    |
| <b>As Sand Cast</b>        |              |           |          |                        |               |                |                |                |                   |               |               |                |                   |                      |
| M01                        | 0.0          | 0         | TYP      | 68                     | 35            | 18             | -              | -              | 20                | -             | -             | -              | 16                | 6.0                  |
|                            | 0.0          |           |          | 20                     | 241           | 124            | -              | -              | 20                | -             | -             | -              | 110               | 8.0                  |
| <b>As Centrifugal Cast</b> |              |           |          |                        |               |                |                |                |                   |               |               |                |                   |                      |
| M02                        | 0.0          | 0         | SMIN     | 68                     | 30            | 14             | -              | -              | 15                | -             | -             | -              | -                 | 0.0                  |
|                            | 0.0          |           |          | 20                     | 207           | 97             | -              | -              | 15                | -             | -             | -              | -                 | 0.0                  |
| <b>As Continuous Cast</b>  |              |           |          |                        |               |                |                |                |                   |               |               |                |                   |                      |
| M07                        | 0.0          | 0         | SMIN     | 68                     | 35            | 20             | -              | -              | 10                | -             | -             | -              | -                 | 0.0                  |
|                            | 0.0          |           |          | 20                     | 241           | 138            | -              | -              | 10                | -             | -             | -              | -                 | 0.0                  |
| <b>As Sand Cast</b>        |              |           |          |                        |               |                |                |                |                   |               |               |                |                   |                      |
| M01                        | 0.0          | 0         | SMIN     | 68                     | 30            | 14             | -              | -              | 15                | -             | -             | -              | -                 | 0.0                  |
|                            | 0.0          |           |          | 20                     | 207           | 97             | -              | -              | 15                | -             | -             | -              | -                 | 0.0                  |

\*Fatigue Strength:  $100 \times 10^6$  cycles, unless indicated as  $[N] \times 10^6$ .

## Physical Properties

| <=" b=">                         | US Customary                                      |
|----------------------------------|---------------------------------------------------|
| Melting Point - Liquidus         | 1790 F                                            |
| Melting Point - Solidus          | 1570 F                                            |
| Density                          | 0.322 lb/in <sup>3</sup> at 68 F                  |
| Specific Gravity                 | 8.910                                             |
| Electrical Resistivity           | 85.90 ohms-cmil/ft @ 68 F                         |
| Electrical Conductivity          | 12 %IACS @ 68 F                                   |
| Thermal Conductivity             | 33.60 Btu · ft/(hr · ft <sup>2</sup> · °F) at 68F |
| Coefficient of Thermal Expansion | $10 \cdot 10^{-6}$ per °F (68-212 F)              |
| Specific Heat Capacity           | 0.090 Btu/lb/°F at 68 F                           |
| Modulus of Elasticity in Tension | 14500 ksi                                         |