

| Mechanical Properties                          | Aluminum  |             |           |           |           |
|--|-----------|-------------|-----------|-----------|-----------|
|  | A360      | A380        | A383      | B390      | A413      |
| <b>Ultimate Tensile Strength</b>               |           |             |           |           |           |
| ksi  | 46        | 47          | 45        | 46        | 42        |
| (MPa)  | (317)     | (324)       | (310)     | (317)     | 290       |
| <b>Yield Strength</b>                          |           |             |           |           |           |
| ksi  | 24        | 23          | 22        | 36        | 19        |
| (MPa)  | 170       | (160)       | (150)     | (250)     | (130)     |
| <b>Elongation</b>                              |           |             |           |           |           |
| % in 2" (51mm)                                 | 3.5       | 3.5         | 3.5       | <1        | 3.5       |
| <b>Hardness</b>                                |           |             |           |           |           |
| Brinell (HV)                                   | 75        | 80          | 75        | 120       | 80        |
| <b>Young's Modulus</b>                         |           |             |           |           |           |
| psi x 10E6                                     | 10.3      | 10.3        | 10.3      | 11.8      | 10.3      |
| (GPa)  | (71)      | (71)        | (71)      | (81)      | (71)      |
| <b>Shear Strength</b>                          |           |             |           |           |           |
| ksi  | 26        | 27          |           |           | 25        |
| (Mpa)  | (179)     | (186)       |           |           | (172)     |
| <b>Impact Strength</b>                         |           |             |           |           |           |
| ft – lb  |           | 3           | 3         |           |           |
| (J)  |           | (4)         | (4)       |           |           |
| <b>Fatigue Strength</b>                        |           |             |           |           |           |
| ksi  | 18        | 20          | 21        | 20        | 19        |
| (MPa)  | (210)     | (140)       | (145)     | (140)     | (130)     |
| <b>Creep Resistance (ASTM E-139 - 200 hrs)</b> |           |             |           |           |           |
| 50MPa @ 150C                                   |           | 0.08        | 0.08      |           |           |
| 50MPa @ 175C                                   |           | ---         | ---       |           |           |
| 50MPa @ 200C                                   |           | ---         | ---       |           |           |
| 70MPa @ 150C                                   |           | 0.17        | 0.18      |           |           |
| Physical Properties                            | Aluminum  |             |           |           |           |
|  | A360      | A380        | A383      | B390      | A413      |
| <b>Density</b>                                 |           |             |           |           |           |
| lbs / cu in.                                   | 0.095     | 0.098       | 0.099     | 0.098     | 0.096     |
| (g / cc)                                       | (2.63)    | (2.71)      | (2.74)    | (2.71)    | (2.66)    |
| <b>Melting Range</b>                           |           |             |           |           |           |
| F  | 1035-1105 | 1,000-1,100 | 960-1,080 | 950-1200  | 1065-1080 |
| C  | (557-595) | (540-595)   | (516-582) | (510-650) | (574-582) |
| <b>Specific Heat</b>                           |           |             |           |           |           |
| BTU / lb - F                                   | 0.23      | 0.23        | 0.23      |           | 0.23      |
| (J / kg - C)                                   | (963)     | (963)       | (963)     |           | (963)     |
| <b>Coefficient of Thermal Expansion</b>        |           |             |           |           |           |
| µin / in / F                                   | 11.6      | 12.1        | 11.7      | 10        | 11.9      |
| (µm / m - K)                                   | (21.00)   | (21.80)     | (21.10)   | (18.00)   | (21.60)   |
| <b>Thermal Conductivity</b>                    |           |             |           |           |           |
| BTU / ft - hr - F                              | 65.3      | 55.6        | 55.6      | 77.4      | 70.1      |
| (W / m - K)                                    | (113.00)  | (96.20)     | (96.20)   | (134.00)  | (121.00)  |
| <b>Electrical Conductivity</b>                 |           |             |           |           |           |
| %IACS  | 29        | 23          | 23        | 27        | 31        |
| <b>Poisson's Ratio</b>                         |           |             |           |           |           |
| (mm / m)                                       | 0.33      | 0.33        | 0.33      |           |           |
| <b>Corrosion Rate</b>                          |           |             |           |           |           |
| (mg / cm <sup>2</sup> / day)                   |           | 0.34        | 0.33      |           |           |

Per NADCA Product Specification Standards for Die Castings/ 2015.