



|            |  |                |                              | High Purity Alumina             |                                 |                                      |                                 |                                 |
|------------|--|----------------|------------------------------|---------------------------------|---------------------------------|--------------------------------------|---------------------------------|---------------------------------|
|            |  | Property       | ASTM Method                  | Units                           | AL995<br>99.5%                  | AL998<br>NSF51<br>Certified<br>99.8% | AL9980<br>99.8%                 | AL999<br>99.9%                  |
| General    | Crystal Size (Average)                           | Thin Section   | Microns                      | 6                               | 6                               | 6                                    | 6                               | 2                               |
|            | Color  | --             | --                           | Ivory-White                     | Ivory                           | Ivory                                | Ivory                           | Off White/<br>Blush             |
|            | Gas Permeability                                 | --             | atms-cc/sec                  | gas tight<br><10 <sup>-10</sup> | gas tight<br><10 <sup>-10</sup> | gas tight<br><10 <sup>-10</sup>      | gas tight<br><10 <sup>-10</sup> | gas tight<br><10 <sup>-10</sup> |
|            | Water Absorption                                 | C 20-97        | %                            | 0                               | 0                               | 0                                    | 0                               | 0                               |
| Mechanical | Density  | C 20-97        | g/cc                         | 3.88                            | 3.91                            | 3.91                                 | 3.91                            | 3.93                            |
|            | Hardness   | Vickers 500 gm | GPa (kg/mm <sup>2</sup> )    | 14.3<br>(1459)                  | 15<br>(1530)                    | 15<br>(1530)                         | 15<br>(1530)                    | 19.6<br>(2000)                  |
|            | Hardness   | --             | R45N                         | 82                              | 86                              | 86                                   | 86                              | 90                              |
|            | Fracture Toughness                               | Notched Beam   | MPam <sup>1/2</sup>          | 4 - 5                           | 3 - 4                           | 3 - 4                                | 3 - 4                           | 5 - 6                           |
|            | Flexural Strength (MOR)<br>(3 point) @ RT°       | F417-87        | MPa (psi x 10 <sup>3</sup> ) | 338 (49)                        | 379 (55)                        | 379 (55)                             | 379 (55)                        | 455 (66)                        |
|            | Tensile Strength @ RT°                           | --             | MPa (psi x 10 <sup>3</sup> ) | 172 (25)                        | 200 (29)                        | 200 (29)                             | 200 (29)                        | 275 (40)                        |
|            | Compressive Strength @ RT°                       | --             | MPa (psi x 10 <sup>3</sup> ) | 2137 (310)                      | 2240 (325)                      | 2240 (325)                           | 2240 (325)                      | 2413 (350)                      |
|            | Elastic Modulus                                  | C848           | GPa (psi x 10 <sup>6</sup> ) | 379 (55)                        | 379 (55)                        | 379 (55)                             | 379 (55)                        | 393 (57)                        |
|            | Poisson's Ratio                                  | C848           | --                           | 0.23                            | 0.23                            | 0.23                                 | 0.23                            | 0.23                            |
| Thermal    | C.T.E. 25 - 100° C                               | C 372-96       | x 10 <sup>-6</sup> /C        | 6.3                             | 6.5                             | 6.5                                  | 6.5                             | 6.5                             |
|            | C.T.E. 25 - 300° C                               | C 372-96       | x 10 <sup>-6</sup> /C        | 6.9                             | 7.9                             | 7.9                                  | 7.9                             | 7.9                             |
|            | C.T.E. 25 - 600° C                               | C 372-96       | x 10 <sup>-6</sup> /C        | 7.6                             | 8.1                             | 8.1                                  | 8.1                             | 8.2                             |
|            | Thermal Conductivity @ RT°                       | C 408          | W/m K                        | 30                              | 30                              | 30                                   | 30                              | 35                              |
|            | Max Use Temp (non-loading)<br>(at high strength) | --             | Fahrenheit (°F)              | 3047                            | 3047                            | 3047                                 | 3047                            | 3100                            |
|            | --   | Celsius (°C)   | 1675                         | 1675                            | 1675                            | 1675                                 | 1700                            |                                 |
| Electrical | Dielectric Strength (.125" Thick)                | D 149-97A      | V/mil                        | 270                             | 290                             | 290                                  | 290                             | 422                             |
|            | Dielectric Constant @ 1 MHz                      | D 150-98       | --                           | 9.8                             | 9.8                             | 9.8                                  | 9.8                             | 9.9                             |
|            | Dielectric Constant<br>@ Gigahertz               | D 2520-95      | --                           | 9.7                             | 10                              | 10                                   | 10                              | --                              |
|            | Dielectric Loss @ 1 MHz                          | D 150-98       | --                           | 9.8                             | 9.6                             | 9.6                                  | 9.6                             | --                              |
|            | Dielectric Loss<br>@ Gigahertz                   | D 2520-95      | --                           | 0.0002                          | < .0001                         | < .0001                              | < .0001                         | < .0001                         |
|            | Dielectric Loss                                  | D 2520-95      | --                           | < .0001                         | < .0001                         | < .0001                              | < .0001                         | --                              |
|            | Volume Resistivity, 25°C                         | D 257          | ohms-cm                      | 9.8                             | 9.6                             | 9.6                                  | 9.6                             | --                              |
|            | Volume Resistivity, 300° C                       | D 1829         | ohms-cm                      | > 1 x 10 <sup>14</sup>          | > 1 x 10 <sup>14</sup>          | > 1 x 10 <sup>14</sup>               | > 1 x 10 <sup>14</sup>          | > 1 x 10 <sup>14</sup>          |
|            | Volume Resistivity, 500° C                       | D 1829         | ohms-cm                      | 1 x 10 <sup>12</sup>            | 3 x 10 <sup>12</sup>            | 3 x 10 <sup>12</sup>                 | 3 x 10 <sup>12</sup>            | 1 x 10 <sup>13</sup>            |
|            | Volume Resistivity, 700° C                       | D 1829         | ohms-cm                      | 5 x 10 <sup>10</sup>            | 6 x 10 <sup>10</sup>            | 6 x 10 <sup>10</sup>                 | 6 x 10 <sup>10</sup>            | 5 x 10 <sup>12</sup>            |
|            | Volume Resistivity, 1000° C                      | D 1829         | ohms-cm                      | 2 x 10 <sup>9</sup>             | 6 x 10 <sup>9</sup>             | 6 x 10 <sup>9</sup>                  | 6 x 10 <sup>9</sup>             | 1 x 10 <sup>12</sup>            |
|            | D 1829   | ohms-cm        | --                           | --                              | --                              | --                                   | --                              |                                 |

Note: The information in this data sheet is for design guidance only. STC does not warrant this data as absolute values. Forming methods and specific geometry could affect properties. Slight adjustments can be made to some of the properties to accommodate specific customer requirements. Most of the dense materials in the table are resistant to mechanical erosion and chemical attack. STC has performed ASTM testing qualification for certain compositions, in accordance with ASTM D2442. Please consult our technical staff for appropriate material and specific test results.

Note: In addition to the above compositions, STC offers a wide range of alternative materials. Please contact one of our applications engineers for material requirements that may not be shown above.

STC AL998 is NSF 51 certified as suitable for use in commercial food equipment. US Patent 8679995 Addition of Magnesium Oxide to [Zirconia Toughened Alumina](#)

