

## Material properties-15GR(ST)

| Test Items   |                                | Unit                   | Result   | Test Method                        |
|--|--------------------------------|------------------------|--|------------------------------------|
| Compressive Strength                                     | Flatwise                       | N/mm <sup>2</sup>      | -  | ISO604:2002                        |
|  | Edgewise                       | N/mm <sup>2</sup>      | 240  |                                    |
| Compressive Modulus                                      | Flatwise                       | N/mm <sup>2</sup>      | -  |                                    |
| Compressive Strength                                     | @30days in 20°C sea water      | N/mm <sup>2</sup>      | 240  |                                    |
| Compressive Strength                                     | @Heating up to 50°C            | N/mm <sup>2</sup>      | 240.0  |                                    |
| Tensile Strength   |                                | N/mm <sup>2</sup>      | 60   | ISO 527-4:1997                     |
| Apparent Interlaminar Shear Strength                     |                                | N/mm <sup>2</sup>      | 80   | ISO14130:2002                      |
| Charpy Impact strength ( notch type)                     |                                | KJ/m <sup>2</sup>      | 33   | ISO 179-2:1997<br>KS M 3015 : 2003 |
| Friction   |                                | μ(min)                 | 0.15   |                                    |
| Hardness (Rockwell M)                                    |                                | HRM                    | 80   | ISO2039-2 :1987                    |
| Thermal expansion  | Flatwise                       | 10 <sup>-6</sup> mm/°C | 38   | ASTM D 696                         |
|  | Edgewise                       | 10 <sup>-6</sup> mm/°C | 240  |                                    |
| Swelling Data  | after 30days in 20°C sea water | vol. %                 | 0.13   | IPASS-S.O.P                        |
|  | after 30days in 80°C sea water | vol. %                 | 2.59   |                                    |
|  | after 30days in 20°C oil       | vol. %                 | 0.09   |                                    |
|  | after 30days in 80°C oil       | vol. %                 | 1.38   |                                    |
| Wear & Friction<br>@10N/mm <sup>2</sup> in wet condition | wear                           | %                      | 1.33   | IPASS-S.O.P                        |
|  | Wall thickness change          | %                      | 2.26   |                                    |
|  | Appearance                     | -                      | Not to find remarkable cracks and delamination |                                    |
|  | Coefficient of friction        | -                      | 0.16   |                                    |
| Wear & Friction<br>@10N/mm <sup>2</sup> in dry condition | wear                           | %                      | 0.09   |                                    |
|  | Wall thickness change          | %                      | 0.21   |                                    |
|  | Appearance                     | -                      | Not to find remarkable cracks and delamination |                                    |
|  | Coefficient of friction        | -                      | 0.05   |                                    |

