

**GEOSYNTHETIC RETAINING WALL  
Classes 1 and 2 Non-aggressive Environments**

**Note 1:** May be used for Class 1 and 2 walls and slopes in non-aggressive environments. Acceptability of the product for a specific contract bid item requires that the approved long-term geosynthetic strength as listed in Table 1 below meet or exceed the required long-term strength specified in the contract. The ultimate tensile strength listed in Table 1 is to be used for lot specific acceptance once the product arrives at the project site. (See Acceptance Code 7021)

**Table 1. Long-term and ultimate strengths of geosynthetic products qualified for use in Classes 1 and 2 walls and reinforced slopes, non-aggressive environments.**

| Product                                 | Ref. No. | Year last Updated | <sup>1</sup> T <sub>ult</sub> (lb/ft) | Long-Term Strength Reduction Factors |                  |                 | <sup>2</sup> Long-Term Tensile Strength, T <sub>al</sub> (lb/ft) | <sup>3</sup> Low Strain Creep Stiffness, J <sub>2%</sub> (lbs/ft) |
|---|----------|-------------------|---------------------------------------|--------------------------------------|------------------|-----------------|--|---|
|   |          |                   |                                       | RF <sub>ID</sub>                     | RF <sub>CR</sub> | RF <sub>D</sub> |  |   |
| Miragrid 2XT, MD - TenCate              | 1993-921 | 2012              | 2000                                  | 1.12                                 | 1.45             | 1.3             | 947  | 11000   |
| Miragrid 3XT, MD - TenCate              | 1993-921 | 2012              | 3500                                  | 1.12                                 | 1.45             | 1.3             | 1660   | 19200   |
| Miragrid 5XT, MD - TenCate              | 1993-921 | 2012              | 4700                                  | 1.12                                 | 1.45             | 1.3             | 2230   | 25800   |
| Miragrid 7XT, MD - TenCate              | 1993-921 | 2012              | 5900                                  | 1.12                                 | 1.45             | 1.3             | 2790   | 32400   |
| Miragrid 8XT, MD - TenCate              | 1993-921 | 2012              | 7400                                  | 1.12                                 | 1.45             | 1.3             | 3510   | 40700   |
| Miragrid 10XT, MD - TenCate             | 1993-921 | 2012              | 9500                                  | 1.12                                 | 1.45             | 1.3             | 4500   | 52200   |
| Miragrid 20XT, MD - TenCate             | 1993-921 | 2012              | 13705                                 | 1.12                                 | 1.45             | 1.3             | 6490   | 75300   |
| Miragrid 22XT, MD - TenCate             | 1993-921 | 2012              | 20559                                 | 1.12                                 | 1.45             | 1.3             | 9740   | 113000  |
| Miragrid 24XT, MD - TenCate             | 1993-921 | 2012              | 27415                                 | 1.12                                 | 1.45             | 1.3             | 13000  | 151000  |
| ParaGrid 30/05, MD – Linear Composites  |          | 2010              | 2055                                  | 1.1                                  | 1.39             | 1.3             | 1040   | 13400   |
| ParaGrid 40/05, MD – Linear Composites  |          | 2010              | 2740                                  | 1.1                                  | 1.39             | 1.3             | 1380   | 16900   |
| ParaGrid 50/05, MD – Linear Composites  |          | 2010              | 3425                                  | 1.1                                  | 1.39             | 1.3             | 1730   | 20200   |
| ParaGrid 60/05, MD – Linear Composites  |          | 2010              | 4110                                  | 1.1                                  | 1.39             | 1.3             | 2070   | 23600   |
| ParaGrid 65/05, MD – Linear Composites  |          | 2010              | 4452                                  | 1.1                                  | 1.39             | 1.3             | 2240   | 25300   |
| ParaGrid 70/05, MD – Linear Composites  |          | 2010              | 4795                                  | 1.1                                  | 1.39             | 1.3             | 2420   | 27000   |
| ParaGrid 80/05, MD – Linear Composites  |          | 2010              | 5479                                  | 1.1                                  | 1.39             | 1.3             | 2760   | 30400   |
| ParaGrid 90/05, MD – Linear Composites  |          | 2010              | 6164                                  | 1.1                                  | 1.39             | 1.3             | 3110   | 33700   |
| ParaGrid 100/05, MD – Linear Composites |          | 2010              | 6849                                  | 1.1                                  | 1.39             | 1.3             | 3450   | 37100   |
| ParaGrid 110/05, MD – Linear Composites |          | 2010              | 7534                                  | 1.1                                  | 1.39             | 1.3             | 3800   | 40500   |
| ParaGrid 125/05, MD – Linear Composites |          | 2010              | 8562                                  | 1.1                                  | 1.39             | 1.3             | 4310   | 45600   |
| ParaGrid 150/05, MD – Linear Composites |          | 2010              | 10274                                 | 1.1                                  | 1.39             | 1.3             | 5170   | 54000   |
| ParaGrid 175/05, MD – Linear Composites |          | 2010              | 11986                                 | 1.1                                  | 1.39             | 1.3             | 6040   | 62500   |
| ParaGrid 180/05, MD – Linear Composites |          | 2010              | 12329                                 | 1.1                                  | 1.39             | 1.3             | 6210   | 64200   |
| ParaGrid 200/05, MD – Linear Composites |          | 2010              | 13699                                 | 1.1                                  | 1.39             | 1.3             | 6900   | 70900   |
| SF20, MD - Synteen                      |          | 2016              | 2025                                  | 1.19                                 | 1.51             | 1.3             | 865  | 16400   |
| SF35, MD - Synteen                      |          | 2016              | 3600                                  | 1.19                                 | 1.51             | 1.3             | 1540   | 23700   |
| SF55, MD - Synteen                      |          | 2016              | 5000                                  | 1.19                                 | 1.51             | 1.3             | 2140   | 30200   |
| SF65, MD - Synteen                      |          | 2016              | 6200                                  | 1.19                                 | 1.51             | 1.3             | 2650   | 35800   |
| SF80, MD - Synteen                      |          | 2016              | 7550                                  | 1.11                                 | 1.51             | 1.3             | 3460   | 42100   |
| SF90, MD - Synteen                      |          | 2016              | 9000                                  | 1.11                                 | 1.51             | 1.3             | 4130   | 48900   |
| SF110, MD - Synteen                     |          | 2016              | 10300                                 | 1.11                                 | 1.51             | 1.3             | 4730   | 54900   |
| SF180, MD - Synteen                     |          | 2016              | 14500                                 | 1.11                                 | 1.51             | 1.3             | 6650   | 74400   |
| SF190, MD - Synteen                     |          | 2016              | 20560                                 | 1.11                                 | 1.51             | 1.3             | 9430   | 102600  |

<sup>1</sup>T<sub>ult</sub> is determined using ASTM D6637 for geogrids and ASTM D4595 for geotextiles. The value provided in the table represents the manufacturer's Minimum Average Roll Value (MARV) or minimum value for the product. WSDOT acceptance test results for the product as delivered to the project must be greater than or equal to this value.

<sup>2</sup>T<sub>al</sub> is determined at a design life of 75 years and is based on the MARV or minimum value for T<sub>ult</sub> provided in this table.

<sup>3</sup>J<sub>2%</sub> is the creep stiffness determined at a strain level of 2% after 1,000 hours of loading, based on the MARV or minimum value for T<sub>ult</sub> provided in this table.

RF<sub>ID</sub> = installation damage reduction factor, RF<sub>CR</sub> = creep reduction factor, RF<sub>D</sub> = durability reduction factor.

MD = Machine Direction (longitudinal direction), XMD = Cross Machine Direction (transverse direction)

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**Table 1. Long-term and ultimate strengths of geosynthetic products qualified for use in Classes 1 and 2 walls and reinforced slopes, non-aggressive environments.**

| Product                    | Ref. No. | Year last Updated | <sup>1</sup> T <sub>ult</sub> (lb/ft) | Long-Term Strength Reduction Factors |                  |                 | <sup>2</sup> Long-Term Tensile Strength, T <sub>al</sub> (lb/ft) | <sup>3</sup> Low Strain Creep Stiffness, J <sub>2%</sub> (lbs/ft) |
|----------------------------|----------|-------------------|---------------------------------------|--------------------------------------|------------------|-----------------|--|---|
|                            |          |                   |                                       | RF <sub>ID</sub>                     | RF <sub>CR</sub> | RF <sub>D</sub> |  |   |
| SF350, MD - Synteen        |          | 2016              | 27600                                 | 1.11                                 | 1.51             | 1.3             | 12700  | 135400  |
| SG150, MD - Stratagrid     |          | 2010              | 1875                                  | 1.1                                  | 1.5              | 1.3             | 875  | 8530  |
| SG200, MD - Stratagrid     |          | 2010              | 3600                                  | 1.1                                  | 1.5              | 1.3             | 1680   | 20500   |
| SG350, MD - Stratagrid     |          | 2010              | 5000                                  | 1.1                                  | 1.5              | 1.3             | 2340   | 26600   |
| SG500, MD - Stratagrid     |          | 2010              | 6400                                  | 1.1                                  | 1.5              | 1.3             | 2990   | 31100   |
| SG550, MD - Stratagrid     |          | 2010              | 8150                                  | 1.1                                  | 1.5              | 1.3             | 3800   | 35600   |
| SG600, MD - Stratagrid     |          | 2010              | 9100                                  | 1.1                                  | 1.5              | 1.3             | 4250   | 37600   |
| SG700, MD - Stratagrid     |          | 2010              | 11800                                 | 1.1                                  | 1.5              | 1.3             | 5510   | 42400   |
| Tensar UX1100MSE MD        |          | 2012              | 3970                                  | 1.25                                 | 2.68             | 1.1             | 1080   | 24500   |
| Tensar UX1400MSE MD        |          | 2012              | 4800                                  | 1.25                                 | 2.68             | 1.1             | 1300   | 27000   |
| Tensar UX1500MSE MD        |          | 2012              | 7810                                  | 1.25                                 | 2.54             | 1.1             | 2240   | 41000   |
| Tensar UX1600MSE MD        |          | 2012              | 9870                                  | 1.25                                 | 2.54             | 1.1             | 2830   | 54700   |
| Tensar UX1700MSE, MD       |          | 2012              | 11990                                 | 1.25                                 | 2.54             | 1.1             | 3430   | 72400   |
| Fortrac 35T, MD - Huesker  |          | 2017              | 2400                                  | 1.26                                 | 1.54             | 1.3             | 951  | 18500   |
| Fortrac 45T, MD - Huesker  |          | 2017              | 3080                                  | 1.2                                  | 1.54             | 1.3             | 1280   | 22100   |
| Fortrac 65T, MD - Huesker  |          | 2017              | 4455                                  | 1.16                                 | 1.54             | 1.3             | 1920   | 29400   |
| Fortrac 80T, MD - Huesker  |          | 2017              | 5480                                  | 1.12                                 | 1.54             | 1.3             | 2440   | 34300   |
| Fortrac 110T, MD - Huesker |          | 2017              | 7535                                  | 1.1                                  | 1.54             | 1.3             | 3390   | 45700   |
| Fortrac 150T, MD - Huesker |          | 2017              | 10275                                 | 1.1                                  | 1.54             | 1.3             | 4620   | 60300   |
| Fortrac 200T, MD - Huesker |          | 2017              | 13700                                 | 1.1                                  | 1.54             | 1.3             | 6170   | 78500   |

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