



# Bemax Geosynthetics Co., Ltd.

## High Density Polyethylene (HPDE) Geomembrane - Smooth

| Properties                                                                                                                                       | Test Method               | Test Value            |                       |                       |                       |                       |                       |                       | Testing Frequency<br>(minimum) |
|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--------------------------------|
|                                                                                                                                                  |                           | 0.75 mm               | 1.00 mm               | 1.25 mm               | 1.50 mm               | 2.00 mm               | 2.50 mm               | 3.00 mm               |                                |
| Thickness - (min. ave.) - mm<br>• owest individual of 10 values - %                                                                              | D5199                     | nom.<br>- 10          |                       |                       |                       |                       |                       |                       | per roll                       |
| Formulated Density (min. ave.) - g/cc                                                                                                            | D 1505/D 792              | 0.950                 |                       |                       |                       |                       |                       |                       | 90,000 kg                      |
| Tensile Properties(1) (min. ave.)<br>• yield strength - kN/m<br>• break strength - kN/m<br>• yield elongation - %<br>• break elongation - %      | D 6693<br>Type IV         | 11<br>20<br>12<br>700 | 15<br>27<br>12<br>700 | 18<br>33<br>12<br>700 | 22<br>40<br>12<br>700 | 29<br>53<br>12<br>700 | 37<br>67<br>12<br>700 | 44<br>80<br>12<br>700 | 9,000 kg                       |
| Tear Resistance (min. ave.) - N                                                                                                                  | D 1004                    | 93                    | 125                   | 156                   | 187                   | 249                   | 311                   | 374                   | 20,000 kg                      |
| Puncture Resistance (min. ave.) - N                                                                                                              | D4833                     | 240                   | 320                   | 400                   | 480                   | 640                   | 800                   | 960                   | 20,000 kg                      |
| Stress Crack Resistance (2) - hr.                                                                                                                | D 5397 (App.)             | 500                   |                       |                       |                       |                       |                       |                       | per GRI GM- 10                 |
| Carbon Black Content (range) - %                                                                                                                 | D 4218(3)                 | 2.0 -3.0              |                       |                       |                       |                       |                       |                       | 9,000 kg                       |
| Carbon Black Dispersion                                                                                                                          | D 5596                    | note (4)              |                       |                       |                       |                       |                       |                       | 20,000 kg                      |
| Oxidative Induction Time (OIT) (5) (min. ave.)<br>(a) Standard OIT - min.<br>(b) High Pressure OIT - min.                                        | D3895<br>D5885            | 100<br>400            |                       |                       |                       |                       |                       |                       | 90,000 kg                      |
| Oven Aging at 85°C (5) (6)<br>(a) Standard OIT (min. ave.) - % retained after 90<br>(b) High Pressure OIT (min. ave.) - % retained after 90 days | D5721<br>D3895<br>D5885   | 55<br>80              |                       |                       |                       |                       |                       |                       | per each formulation           |
| UV Resistance (7)<br>(a) Standard OIT (min. ave.)<br>(b) High Pressure OIT (min. ave.) - % retained after 1600 hrs (9)                           | D 7238<br>D 3895<br>D5885 | N. R.(8)<br>50        |                       |                       |                       |                       |                       |                       | per each formulation           |

(1) Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction

Yield elongation is calculated using a gage length of 33 mm

Break elongation is calculated using a gage length of 50 mm

(2) The yield stress used to calculate the applied load for the SP-NCTL test should be the manufacturer 's mean value via MQC testing.

(3) Other methods such as D 1603 (tube furnace) or D 6370 (TGA) are acceptable if an appropriate correlation to D 4218 (muffle furnace) can be established.

(4) Carbon black dispersion (only near spherical agglomerates) for 10 different views:9 in Categories 1 or 2 and 1 in Category 3

(5) The manufacturer has the option to select either one of the OIT methods listed to evaluate the antioxidant content in the geomembrane.

(6) It is also recommended to evaluate samples at 30 and 60 days to compare with the 90 day response.

(7) The condition of the test should be 20 hr. UV cycle at 75 °C followed by 4 hr. condensation at 60 °C.

(8) Not recommended since the high temperature of the Std-OIT test produces an unrealistic result for some of the antioxidants in the UV exposed samples.

(9) UV resistance is based on percent retained value regardless of the original HP-OIT value.