Dr. Shobha Bhatia and Gautam Kasturi of Syracuse University conducted interface friction angle testing of 3 different types of PVC geomembranes and 2 types of HDPE membranes with sand, sandy loam, silty clay and non-woven geotextile. The results of their testing with non-woven geotextile are summarized at the right. The shear stress at 10% strain for the rigid membranes (HDPE & HDT) is less than at the peak. However, for the flexible PVCs, due to their stretching during the tests, the strength at higher strain is greater than at lower strain. This was observed with all PVC interfaces with all the other interface materials, except with fine sand. Further shearing of the PVC causes an increase in strength and not a decrease, whereas further shearing in HDPE causes reduced strength. Therefore, under field conditions, if the PVC membranes are stressed beyond the yield stress for the interface, the material stretches under the load without any loss of strength or material damage.

Smooth PVC had a higher friction angle with the geotextile than textured HDPE. This is believed to be due to reduction in contact area since the rough side of the geotextile and the rough surface of the geomembrane are in contact at texture points only. Nonwoven Geotextile Interface Friction Angle Values at 10% strain:

- 30 mil Smooth PVC: 21.9
- 30 mil Textured PVC: 19.6
- 30 mil File Finish PVC: 17.3
- 60 mil Smooth HDPE: 14.2
- 60 mil textured HDPE: 17.4

“The stress stain behavior of PVC is much different from that of HDPE. Even after reaching yield stress of the interface, PVC interfaces will not fail but maintain stability by stretching of the membrane material without loss of strength or material damage.”

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