

PEEL TESTING OF NEEDLEPUNCHED GCLs

In reinforced GCLs, the top and bottom geotextiles are needlepunched together to increase internal shear strength. During manufacturing quality control (MQC), needlepunched GCL manufacturers conduct peel testing as an index test of the bonding strength of the needlepunched fibers. Historically, GCL manufacturers used a modified version of a pre-existing geotextile test method, ASTM D 4632, *Standard Test Method for Grab Breaking Load and Elongation of Geotextiles*, to test GCL peel strength. However, in 1999, a new test method, ASTM D6496, *Standard Test Method for Determining Average Bonding Peel Strength between the Top and Bottom Layers of Needlepunched GCLs*, was developed specifically for GCLs. The ASTM D 6496 standard involves 4" x 8" specimens and 4-inch wide grips. Using a knife or razor, the top and bottom geotextile layers of the GCL specimen are separated for the first 2 inches on one edge. Then, one geotextile is set in the top tensiometer grip and the other geotextile set in the bottom tensiometer grip. The textiles are pulled apart at a rate of 12 inches/min. Force and time readings are taken between 2 inches and 10 inches of grip separation, at a minimum rate of 20 readings per second.

Figure 1 shows a 4" x 8" specimen being clamped in 4" wide grips for D6496 testing.

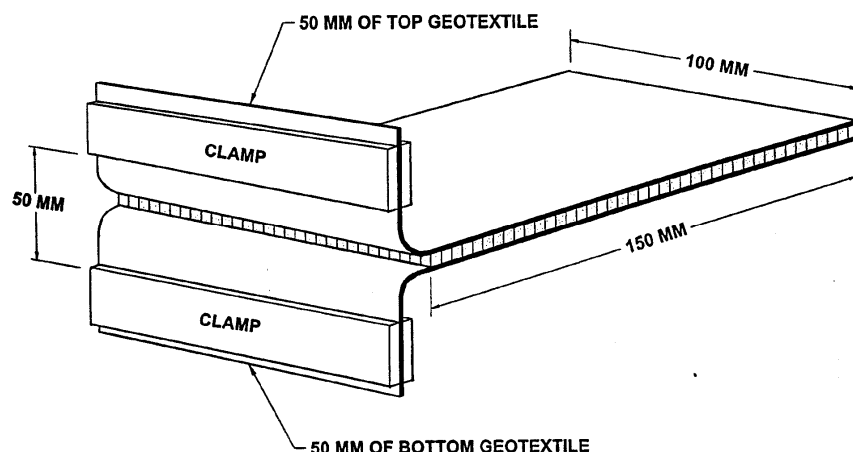


Figure 1. Clamping of GCL Peel Specimens

ASTM D 6496 reports the average peel strength in units of lbs/inch in contrast to the previous standard, ASTM D 4632, which reports peak peel strength in units of lbs force.

Figure 2 shows typical results of peel testing of a needle-punched GCL. The various peaks and low points indicate different tufts of fibers being placed in tension until they break or pull-out, followed by the reduction of the specimen strength until other tufts of fibers are placed in tension. It is clear that the initial portion of curve indicates the geotextile initial loading and elongation prior to peeling of the fibers actually occurring. Consequently, the readings from the first 2" of displacement are not used in the calculation of the average bonding strength. Five specimens will be taken across the roll width and the average of the five peel strength values will be reported.

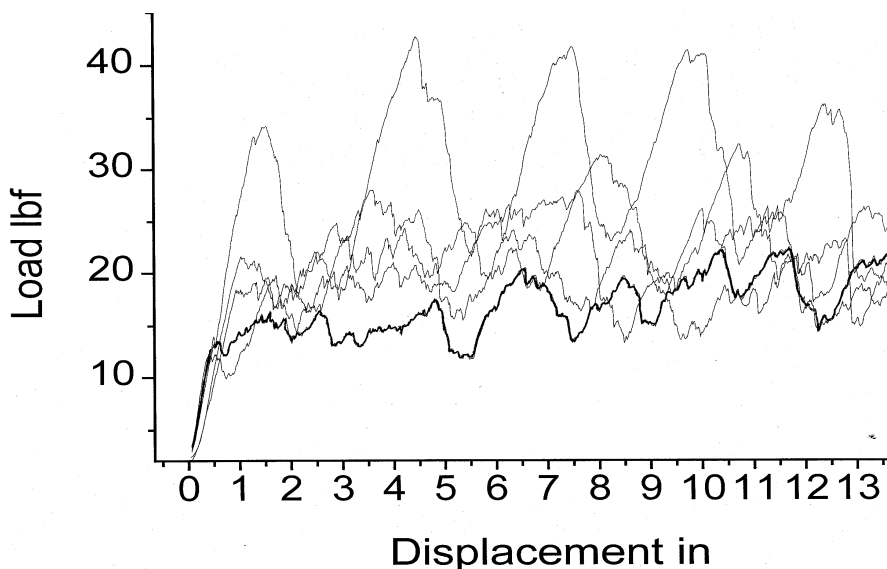


Figure 2. Load versus displacement of 5 specimens in GCL peel test

Testing comparing the modified ASTM D4632 to the corrected ASTM D6496 has been performed in Europe and the U.S. The results indicate that the average peel strength, in units of force, is equivalent to approximately two-thirds of the peak peel strength. ASTM D6496 states that the result shall be reported in units of force per unit length. Thus, the U.S. units will be pounds per inch, lbs/inch, and the S.I. units will be newtons per meter, N/m.

REFERENCES

ASTM D4632-96, *Standard Test Method for Grab Breaking Load and Elongation of Geotextiles*, Vol. 04.09, ASTM International, W. Conshohocken, PA.

ASTM 6496-99, *Standard Test Method for Determining Average Bonding Peel Strength between the Top and Bottom Layers of Needle-punched GCLs*, Vol. 04.09, ASTM International, W. Conshohocken, PA.