

# GENERAL BENTONITE LINER INSTALLATION GUIDE FOR DECORATIVE AND IRRIGATION PONDS

1. Excavate pond to desired size and shape. Over excavate the perimeter area 6-12 inches if possible (see item 4 below). The slope of the sides should not be any steeper than a drop of 3:1 (one foot vertical drop in three horizontal feet). Remove all obstacles such as rocks, roots, shrubs and plant debris, etc. If a large quantity of small rock or shale is present in the soil and would be difficult to remove, over excavate 6 inches of pond bottom and replace with suitable soil. Rake pond bottom as smooth as possible.
2. Your pond is now ready for bentonite. To determine the exact amount of bentonite required, a permeability test must be done using a representative soil sample and a sample of bentonite. A local geo-technical testing lab can perform this test or H & H Environmental can, at a nominal fee, arrange testing at our plant. This test takes about 2 weeks time and cost about \$300 to \$500. If you choose not to test your soil, we can estimate the approximate quantity of bentonite by the condition of the soil. Soils with a large quantity of clay present generally use about 4-6 lbs. per square foot of bentonite, sandy soils require 8 to 12 lbs per square foot.
3. Spread the bentonite in an even and uniform layer along the bottom and sides for the pond to a point 18 inches above the water line. Thoroughly mix the bentonite in with the soil 3 to 4 inches deep using a rototiller or similar type equipment. Then wet down the soil-bentonite layer lightly with a watering hose, raising the moisture content enough to enable the layer to be compacted. Using a heavy wheel roller, vibrator compactor, tamper or heavy equipment such as a front end loader, compact the entire area as much as possible (90-95% proctor). Thorough mixing and then good compaction, which decreases the amount of voids in the soil-bentonite layer, are critical to the overall performance of the bentonite.
4. To ensure long lasting results, cover at least the pond perimeter from 1 foot above the water line to 4 feet below the water line with 6 to 12 inches of soil. Then place large river rock or gravel on the soil. This will form a buffer layer to protect the liner system from damage by animals, rodents and erosion and will add to the overall esthetics of the pond.
5. Fill the pond with fresh water shortly after compaction, while the soil bentonite layer is still moist and compacted. The bentonite will hydrate and swell filling the remaining voids in the soil-bentonite layer creating your overall seal. If the pond is unable to be filled after compaction for an extended period of time or becomes dry, re-wet and compact pond again before filling.
6. For waterfalls or large water features, guard against erosion by placing small piece of liner material with large rocks on top where the forceful water hits enters the pond.
7. If you develop any leaks or you lose excessive water (remember, you will always lose water through evaporation), simply spread additional bentonite, mix and compact over the surface area where you suspect the leak. Its best to do this in a dry condition, but if that

is not possible pour coarse grade or plug type bentonite from 50# bags over the leaking area and it will generally repair the leak.