

Silt Curtains

Permeability

Technical Note



The aim of a silt curtain is to act as a settlement pond and allow the silts time to settle within the contained area to reduce the spread. Silt curtains are not designed to impound water completely, and it is reasonably expected that some silts will move underneath. By allowing the silts to settle from the upper portion of the water body, the area of spread will be limited significantly, and the chance of the silts being re-suspended will be reduced.

It is a common misconception that, to be effective, the curtain should be completely impermeable, or that at minimum, the opening size of the fabric should be smaller than the size of the particles suspended in the water. Before attempting to reduce the permeability of the materials, one must first consider that the strength of the materials will be sufficient for the environmental conditions.

One of the most commonly used test methods for determining the Apparent Opening Size (AOS) of a geotextile is ASTM D4751, which uses glass beads of a known diameter and determines the O_{95} size by standard dry sieving. Sieving is done using beads of successively larger diameter until the weight of boats passing through the test specimen is 5%. This defines the O_{95} size of the geotextile openings in mm.^{1,2}

This is a poor test that has been criticized in numerous papers, largely due to:

- It being conducted in a dry environment, whereas filtration and drainage always involve liquids;
- The glass beads becoming trapped in the geotextile and not passing through at all;
- Electrostatic charges resulting in finer glass beads clinging to the sieve.

- Yarns in geotextiles, particularly wovens, shifting and allowing beads to pass through enlarged voids that are not representative of the sample.

Specifically for the treatment of silt curtains, this test is not only flawed but also provides a very basic one dimensional view. It does not take into account that silt curtains installed in a marine environment will quickly become effectively impermeable to particles, regardless of the material due to:

- Expansion of the geotextile fibres in water;
- Marine growth;
- Formation of filter cake on outside of material;
- Particle clogging of pores, which can result in a reduction in coefficient of water permeability by up to 84% after 180 minutes of artificial clogging.³

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In terms of particle size, sand is classified as size between 0.05mm-2.0mm, silt between 0.002mm-0.05mm, and clay less than 0.002mm. By basing silt curtain material selection only on permeability assumptions defined by ASTM D4751, incorrect conclusions can be drawn that these particles will pass through the fabrics and as a result lead to incorrect selection of fabrics to

weaker fabrics.

It is our belief that the above factors void requirements for skirt fabrics to have a minimum opening size or flow rate, and the sole deciding basis for skirt fabric should be tensile strength, designed to suit the environment of the installation. This will ensure the curtain a) performs in the environmental conditions for which

it is selected, and b) does not fail, which can cause a much larger environmental incident than a few particles transferring through the fabric.

For more information on types of curtains available as well as detailed specifications, please visit www.ecocoast.com. Any curtain can be custom manufactured to suit local requirements.

References

- 1 ASTM D4751 (2012) 'Standard Test Method for Determining Apparent Opening Size of a Geotextile' ASTM, West Conshohocken, PA.
- 2 Koerner R. (2012) 'Designing with Geosynthetics - 6th Edition'.
- 3 Miskowska A., Lenart S., Koda E. (2017) 'Changes of Permeability of Nonwoven Geotextiles due to Clogging and Cyclic Water Flow in Laboratory Conditions'.