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6-6 OTHER INSTALLATION CONSIDERATIONS

Flotation

Pipe of any material and size can float under the right conditions. The soil type and density, amount of cover, height of the water table, pipe weight, and the amount of effluent in the pipe will all have an effect on the flotation potential.

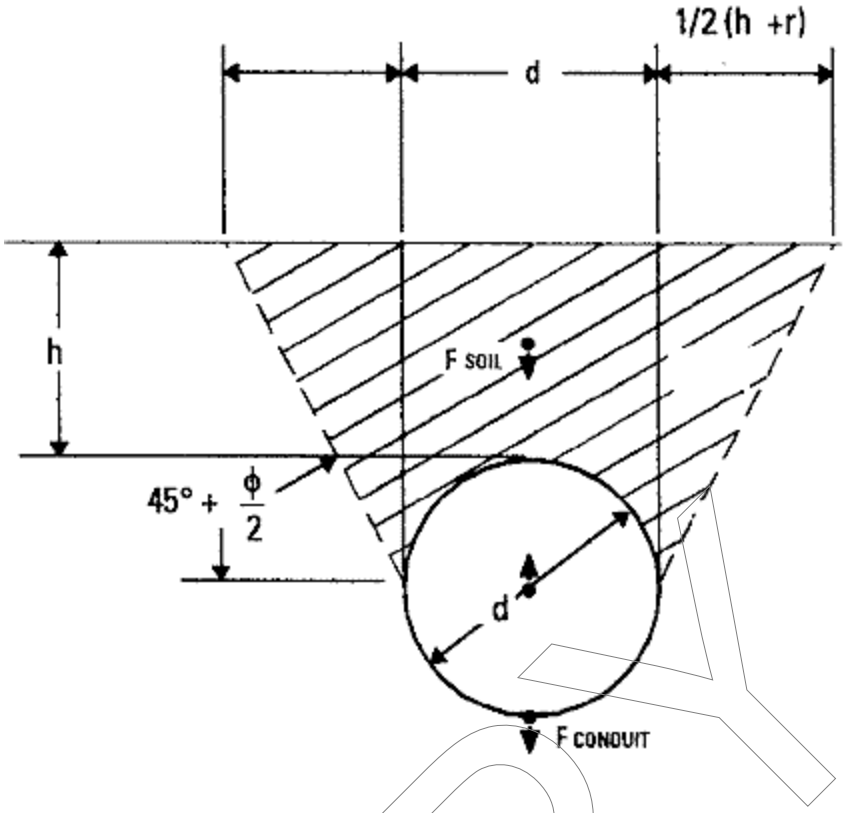
The pipe property affecting flotation is its weight: heavier products are not as likely to float. One of the primary installation benefits of Hancor polyethylene pipe is its light weight. The same quality that provides easy handling and installation also provides it with a greater opportunity to float.

A review of Hancor products was made to check for flotation problems. Because of the many factors affecting flotation, several assumptions had to be made. These assumptions were as follows:

- The pipe was assumed to be empty. This not only simplifies the calculations but creates a condition that would encourage flotation. Unless the system is constructed to be watertight, this condition would not likely be found in an actual installation.
- A soil friction angle (Ø) of 36.87 degrees was selected. This value is appropriate for most sand/gravel mixtures and will yield conservative results.
- For corrugated pipes, such as Sure-Lok® and Heavy Duty, the average of the inner and outer diameters was used to determine soil and water displacement.
- Soil density used was 120 pcf (1930 kg/m^3) which is typical for many saturated soil mixtures. Soils of greater densities will reduce the chance of flotation.
- The water table was assumed to be at the ground surface thereby simulating a fully saturated soil. This assumption created a “worst case” condition to yield more conservative results.
- Granular soils are recommended in most installations. Many soils do exhibit some degree of cohesion which would reduce the effects of flotation; however, this sample problem involved granular, or cohesionless, soils.

A diagram of the forces affecting the pipe is shown in Figure 6-6.

Figure 6-6 – Forces Affecting Flotation



A summary of the fill required to prevent flotation based on the above assumptions is shown in Table 6-6. Note that in many cases, less than 1' (0.3m) is needed. However, for structural purposes, a minimum of 1' (0.3m) of cover is required.

Table 6-6 – Minimum Cover Required to Prevent Flotation

	Diameter in. (mm)	Cover in. (m)
Sure-Lok®, Sure-Lok F477, Sure-Lok WT and Hi-Q®	4 (100)	2 (0.05)
	6 (150)	3 (0.08)
	8 (200)	4 (0.10)
	10 (250)	5 (0.13)
	12 (300)	6 (0.15)
	15 (375)	7 (0.16)
	18 (450)	8 (0.20)
	24 (600)	11 (0.28)
	30 (750)	14 (0.36)
	36 (900)	16 (0.40)
	42 (1050)	18 (0.46)
	48 (1200)	21 (0.53)
	54 (1350)	23 (0.58)
	60 (1500)	25 (0.64)
	3 (75)	2 (0.05)
	4 (100)	2 (0.05)
	6 (150)	3 (0.08)

Heavy Duty	8 (200)	4 (0.10)
	12 (300)	5 (0.13)
	15 (375)	6 (0.15)
	18 (450)	7 (0.18)
	24 (600)	11 (0.28)
Smoothwall	3 (75)	1 (0.03)
	4 (100)	2 (0.05)
	6 (150)	2 (0.05)

In spite of their light weight, Hancor products will not float when just a small amount of cover is placed on the pipe. Additionally, if effluent were in the pipe, as would be likely in the case of a fully saturated soil, its weight would further hinder flotation.

A second very important variable is the burial depth. During installation when the pipe has not yet been covered over with soil, flotation potential increases. If conditions on a specific project differ greatly from these and flotation is believed to be a valid consideration, Hancor Application Engineers are available to help determine the extent of the problem.