GDT 30

A. Scope

For a complete list of GDTs, see the Table of Contents.

Use this test method to determine the coefficient of permeability of underdrain sand.

B. Apparatus

The apparatus consists of the following:

1. Permeability Apparatus: Use the equipment shown in Figure 30-1.
2. Clear Plexiglass Tube: Use a clear plexiglass tube with a 2 in (50 mm) inside diameter and with a sieve wire and base.
3. Base Tank Container
4. Funnel
5. Mixing Bowl (WB-12)
6. Large Spoon (WS-14)
7. Oven: Use an oven that can control the temperature between 212 ° and 230 °F (100 ° and 110 °C).
8. CO2 Supply Attachment
9. Two Stop Watches: Use watches calibrated to 1/100 minute divisions (WS-15).

C. Sample Size and Preparation

1. Dry the sample to a constant weight.
2. Allow the sample to cool.
3. Split approximately 3.3 lb (1500 g) to represent the sample. However, be careful not to lose any fine material while splitting the sample.
4. Place the sample in a mixing bowl and mix with a spoon until material is uniform.

CAUTION: Do not mix too much and allow the fine material to settle to bottom of bowl. Make sure you mix the sample to be sure it represents the sand used.

5. Place the rubber part of the funnel into the sand section of the permeability tube.
6. Carefully dip material with the spoon and dump it into the funnel.

CAUTION: Do not allow material to slide off side of spoon while dipping and do not allow excessive sliding of material in funnel. Continue filling sand section until material reaches sand level mark.

7. Place the sand section of the tube in the CO2 apparatus and adjust the rate of CO2 flow to 0.4 gal (1.5 L) per minute for 30 seconds.
8. Close off the escape tube and allow CO2 to flow through the sample for 15 minutes.
9. Fit the top portion of the permeability tube on the sand section.
10. Fill the base container with tap water at room temperature.
11. Slowly place the permeability tube into the base container.

CAUTION: Do not allow water level to rise too fast in sample to cause cross-sectional separation.

12. Allow water to rise to the water level mark on the tube.
13. Clamp tube to the base container with a tube support rod.

D. Procedures

1. Run tap water into the top of the permeability tube until the water level is above the "L" mark. If the water has suspended material, allow suspension to settle out, then refill with water.
2. As the meniscus passes L1 of Figure 30-1, start one watch.
3. When the meniscus passes L2, stop the first watch with one finger and start the second watch with another finger at the same time. Use two fingers from the same hand to be as close to exact as possible.
4. When the meniscus passes L3, stop the second watch.
5. The two times should be within 2 percent of their average. If the times do not fall within 2 percent of their average, make another trial using the same loaded specimen.

E. Calculations

1. Calculate the 2 percent of average time.

   where: $\frac{2(B-C)}{B+C} \times 100 = \text{less than } 2\%$

   B = is largest of two times

   C = is smallest of two times

2. Calculate the permeability.

   where: $K = \frac{276\ Cd}{t} \log \frac{h_1}{h_2}$

   K = Permeability in feet (meters) per day

   276 = Constant

   C = Temperature correction (viscosity of water at room temperature divided by viscosity of water at 68 °F [20 °C])

   d = Depth of sand specimen in inches (millimeters)

   t = Time in minutes required for water to drop from h1 to h2

   h_1 = Initial level of water in inches (millimeters)

   h_2 = Final level of water in inches (millimeters)

F. Report

Report the permeability value to the nearest foot (meter) per day on Form 168.

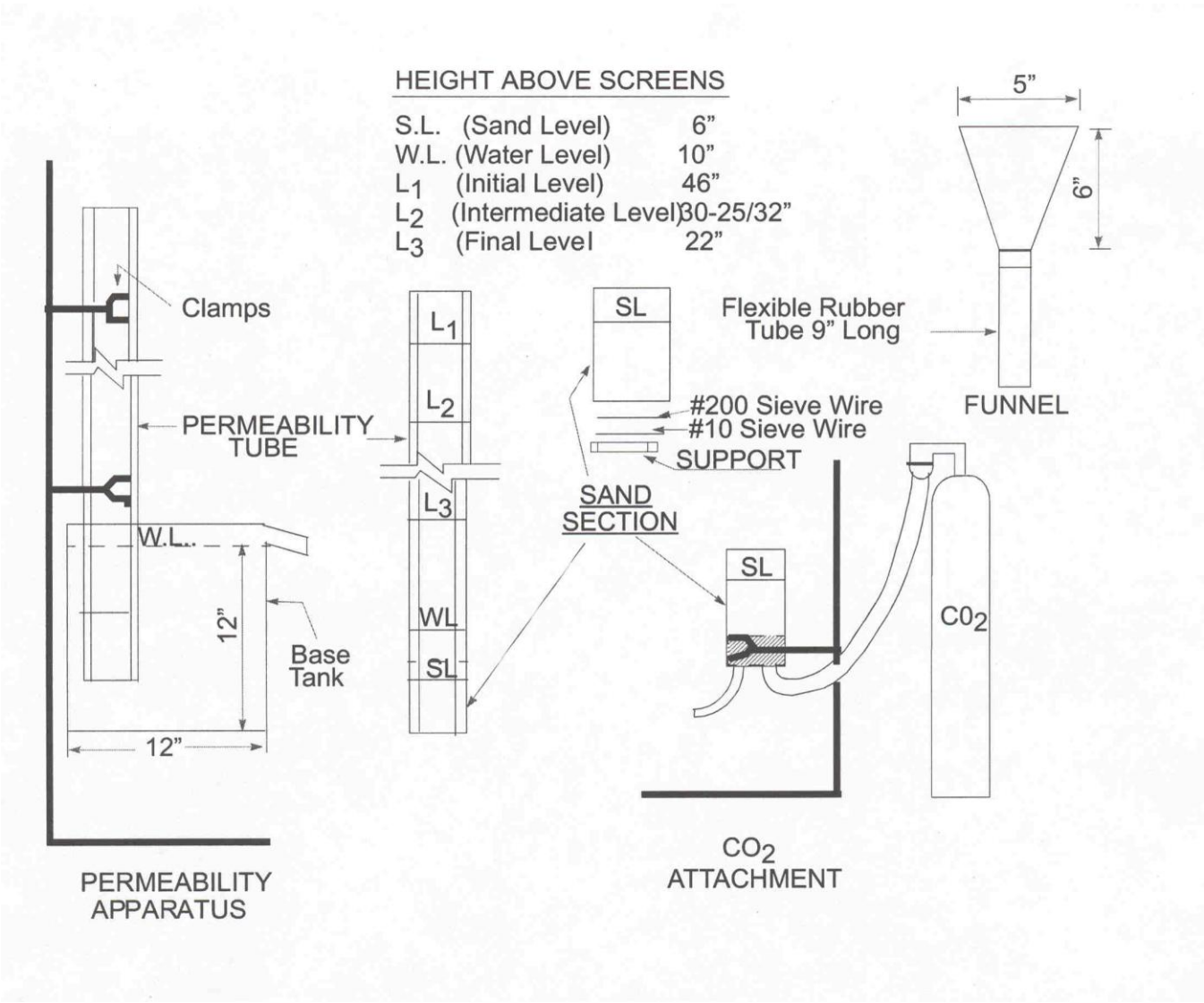
HEIGHT ABOVE SCREENS
S.L. (Sand Level) 6”
W.L. (Water Level) 10”
L1 (Initial Level) 46”
L2 (Intermediate Level) 30-25/32”
L3 (Final Level 22”
5”
6”
Clamps
PERMEABILITY TUBE
W.L.
12”
Base Tank
12”
L1
L2
L3
WL
SL
SL
Flexible Rubber Tube 9” Long
#200 Sieve Wire
#10 Sieve Wire
SUPPORT
SAND SECTION
FUNNEL
SL
CO2
PERMEABILITY APPARATUS
CO2 ATTACHMENT

Figure 30-1