UNIVERSITY OF KWAZULU-NATAL	*Standard Operating Procedure* PRG pollution research group	**Effective Date:** 20 June 2013	**Version:** ***002***
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Standard Operation Procedure – Plastic Limit

1. Scope and Application

- The plastic limit of a soil is the experimentally determined moisture content at which it is too dry to behave plastically.
- It indicates the strength rate of a material at a given moisture content
- It is used in conjunction with the liquid limit to produce the Plasticity Index to classify soils.
- This method is adapted from the British Standard BS 1377-2:1990 for use on faecal sludge.

2. Summary

- The sample is moulded into a thin thread of approximately 3mm and from a ball until cracks appear in the thread, longitudinally and transversely.
- The moisture content at which the cracks appear is the plastic limit.

3. Interferences

- Results are subject to the interpretation of the researcher hence variations in results may occur.
- When this method is applied to soils heat from the hands is expected to dry out the soil to lead to the transverse and longitudinal shearing.
- The length of time taken to dry out the sludge may be extended due to the necessity of wearing latex gloves.

4. Sampling

- Store samples in plastic or glass containers, taking note of the date the sample was taken.

5. Safety Precautions

- Always use safety glasses, gloves, closed shoes and laboratory coat when working in the laboratory.
- Ensure there are no holes in gloves when excessive handling of sludge is required.
- Dispose of sample in the sluice when test completed.
- Thoroughly clean all equipment after use.
- Any equipment that will be taken out of the laboratory should be handled with clean gloves only and disinfected with 70% ethanol after use.
- Dispose of used gloves when analysis completed.
- Wash hands with antiseptic soap and disinfect with 70% ethanol when analysis completed.
- Use metal trays to place soiled equipment when not in use.
- Avoid spillage and contact with skin. In latter case use copious washings with cold water and call for medical attention.

6. Apparatus

- Flat glass plate, to mix and roll samples; 10mm thick, 300mm square.
- Two palette knives or spatulas.
- A length of rod 3mm in diameter and 100mm long.
- Apparatus for moisture content determination.

7. Sample Preparation –Faecal Sludge

- Try to select a representative sample. Use glass plate.
- Ensure the sample is well mixed.
- Do not allow sample to dry before testing.
- Sample should be of a soil in its natural state, or where the material remaining on a 425 µm test sieve has been removed from the soil.

8. Reagents

- Nil.

9. Calibration

10. Procedure

1. Approximately 20g of sample is placed on glass plate for mixing.
2. Allow sample to dry until it is plastic enough to be shaped into a ball.
3. Mould the sample into a ball between the fingers and then roll it between the palms until the heat of the hands has made it dry enough that small cracks appear on the surface.
4. Divide sample into 2 subsamples of approximately 10g, carrying out a separate determination for each subsample.

5. Divide each subsample into 4 more approximately equal samples and apply the following steps to each sample.
6. Mould the sample between the fingers to equally distribute the moisture and then roll the sample into a thread of approximately 6mm between the thumb and first finger.
7. Roll the thread on the glass plate with the fingers, from their tip to the second knuckle using enough pressure to reduce the diameter to approximately 3mm in 5 to 10 forward and backward rolls.
8. It is important to maintain a constant rolling pressure.
9. Pick up the sample and mould between fingers, reproduce a thread shape and repeat steps 7 and 8.
10. Continue step 9 until the thread shears both longitudinally and transversely when it is rolled to 3mm diameter, which is determined using the rod.
11. Do not collect the pieces and reproduce the thread, as the first crumbling point is the plastic limit.
12. Place the pieces of the thread in a container and seal with a lid.
13. Place the pieces of all four threads in the one container and determine the moisture content.
14. Repeat steps 5 through 11 for the second set of 4 samples.
15. If the moisture content of the 2 samples differs by more then 0.5% the whole test must be repeated.
16. Calculate the average of the two moisture content values and round to the nearest whole number. This is the plastic limit.

APPROVAL OF STANDARD OPERATING PROCEDURE

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