# Procedure Checklist
## AASHTO T-89 Liquid Limit of Soils

*Note: The checklist for this method covers procedures for Method A.  Semi-logarithmic paper is required for Step 23.*

| | | P | F | N/A |
|---|---|---|---|---|
| **Preparation** | | | | |
| 1. | Sample obtained in accordance with AASHTO R 58 of T 146. | | | |
| 2. | Sample of about 100 g of the material passing the No 40 (0.425 mm) sieve. | | | |
| 3. | Soil mixed with 15 to 20 mL of distilled or demineralized water in the mixing dish. | | | |
| 4. | Mixed by repeatedly stirring, kneading, and chopping with a spatula. | | | |
| 5. | Additional water introduced in increments of 1 to 3 mL, mixing each increment thoroughly before adding the next increment, until the soil forms a uniform mass of stiff consistency. | | | |
| 6. | If too much moisture has been added, sample either discarded or mixed and kneaded until the natural evaporation stiffens soil into an acceptable range. | | | |
| 7. | No additional dry soil added once testing has begun. | | | |
| **Procedure** | | | | |
| 8. | Liquid limit device inspected for wear and ensured to be in proper working order.  Height of drop of the cup adjusted so that the point of the cup that comes in contact with the base rises to a height of $10.0 \pm 0.2$ mm. | | | |
| 9. | Sufficient quantity of the soil/water mixture placed into the cup above the spot where the cup rests on the base. | | | |
| 10. | Care taken to use as few strokes as possible and prevent entrapping air bubbles in the soil. Soil squeezed and spread with the spatula to level while trimmed to a depth of 10 mm at the point of maximum thickness. | | | |
| 11. | Returned excess soil to the mixing dish and cover to retain moisture. | | | |
| 12. | Curved tool: Divided the soil in the cup with a maximum of six firm strokes (only the last of which scrapes the bottom of the cup) along the diameter of the cup through the centerline of the cam follower. | | | |
| 13. | Flat tool: Beveled edge forward, groove formed by drawing the tool forward, Several strokes used if necessary or spatula used to cut groove slightly less than required then finished with grooving tool. | | | |
| 14. | Avoided tearing the sides of the groove or causing the soil cake to slip. | | | |
| 15. | Without holding the base with the free hand, cup lifted and dropped at a rate of approximately two revolutions per second until the two sides of the sample at the bottom of the groove come into contact along a distance of about 13.0 mm | | | |
| 16. | Recorded the number of shocks. | | | |
| 17. | Removed a slice of the soil approximately the width of the spatula, extending from edge to edge of the soil cake at right angles to the groove (including that portion of the groove in which the soil flowed together), and placed in a suitable moisture container. | | | |
| 18. | Moisture content of the sample determined in accordance with AASHTO T-265. | | | |
| 19. | Soil remaining in the cup transferred back to the mixing dish and cover. | | | |
| 20. | Grooving tool and cup washed and dried for next trial. | | | |
| 21. | Sufficient water added to the sample in the mixing dish to bring the soil to a more fluid condition. | | | |
| 22. | Repeated steps 9 through 21 until at least one test is recorded within each of the following ranges of shocks: 25 - 35; 20 - 30; 15 - 25; and the range of the three tests is at least 10 shocks. | | | |
| 23. | Calculated the moisture content of the soil to the nearest whole percent as follows: $$\text{Percentage moisture} = \frac{\text{mass of water}}{\text{mass of oven dried soil}} \times 100$$ | | | |
| 24. | Drew a flow curve on a semi-logarithmic graph by plotting moisture contents as abscissae on an arithmetical scale and number of shocks as ordinates on the logarithmic scale, then drawing a straight line as nearly as possible through the three or more plotted points. | | | |
| 25. | Determine the liquid limit of the soil by locating the intersection of the flow curve with the 25 shock ordinate and reported to the nearest whole number. | | | |

**Remarks:**          **Comparison Criteria:    Maximum Difference = ±13% of mean Liquid Limit**

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