

ATT-59/99, SMOOTHNESS OF PAVEMENTS
Part III, ES 2000 Paveset Profilograph

1.0 SCOPE

This method describes the procedure for operating the ES 2000 Paveset Profilograph.

- a) Operating the profilograph to determine PrI.
- b) Locating individual bumps and dips in excess of 8 mm.

Note: This procedure is not intended to be a complete operating manual. Refer to the Paveset Model ES 2000 Profilograph Operating Manual for complete information.

2.0 EQUIPMENT

Paveset Profilograph (model ES 2000)
Profile bump/dip template (8mm)
PrI template for horizontal calibration checks

Calibration equipment:

chain (or tape), keel, pylons
base plate
10 mm calibration block

DATA SHEET: Profilograph Index Report MAT 6-73. Refer to ATT 59 Part I.

3.0 PROCEDURE

3.1 Calibration of Profilograph

The accuracy of the profilograph should be checked when the profilogram results are in doubt.

3.1.1 Calibration of Wheel (Horizontal Calibration)

The horizontal calibration may be checked by comparing a 100 m section of profilogram to the length of a PrI template.

Before calibrating:

- a) Assemble ES2000 Profilograph according to the operating manual and start the Paveset program.
- b) Pick "Go to" Menu and then click "Calibration"

- c) Check the diameter settings for the measuring wheel by clicking “Measuring Wheel”. Initially, set the diameter of the Sensing wheel at 0.2m. As the profilograph is used, the diameter of the measuring wheel may change. The actual diameter must be determined using a trial section of known length and adjusting the diameter accordingly.
1. Choose a paved stretch of road (or parking lot), 100 m in length. Ensure the test section is relatively flat with good visibility for oncoming traffic from both directions.
 2. Ensure that the current safety regulations are followed.
 3. Use the keel to mark the starting point on the pavement. Place a pylon beside the mark as a reference while chaining.
 4. Use the chain (or tape) to measure a straight line distance of 100 m, marking on the pavement intermediate reference points every 10 m.
 5. Mark the end point with a keel and place a pylon beside the mark.
 6. Run the profilograph to the end of the measured distance.
 7. If the profilograph measures 102 metres or 2% error, you will need to adjust the wheel diameter as follows:

$$(\text{diameter setting} - (\text{diameter setting} \times 0.02\%))$$
 8. Enter the new measuring wheel setting.
 9. Run the measured distance again as a final check.

3.1.3 Calibration of Sensors(Vertical Calibration)

1. Guide the assembled profilograph to a level stretch of pavement.
2. Pull the profilograph into position so all bogey wheels will be in their traveling position.
3. Click “Sensors”. Calibrate either side by clicking the appropriate side and follow the directions on the screen as follows:
4. A window will appear showing the left and right sides.
5. Insert the base plate under the side in which you are calibrating.
6. Click “Proceed”. Insert the 10 mm calibration block under the corresponding measuring wheel.
7. Type in “- 10”, for the side that is calibrated. You must include the minus sign when calibrating.

8. Click "Proceed", with the calibration block under the corresponding measuring wheel.
9. Take out the calibration block and the deflection should go back to 0. If not the profilograph may need repairs.
10. Repeat procedure for other side.

3.1.4 Speedometer Settings

1. Click "View" and "Speed Monitor". Set the speed at 5 km/hr.

Note: Excessive speed can affect the recorded readings, recording speeds should not exceed 5 km/hr.

3.1.5 Setting the Parameters

1. FILTER is set at 3.
2. BLANKING BAND WIDTH specifies the width of the null bank band. This is set at 2.5 mm (half of the blanking band).
3. MUST GRIND Bump is the height used for the maximum allowable bump. This is set at 8 mm.
4. MUST FILL Dip is the depth used for the maximum allowable dip. This set at is 8 mm.
5. SUBLOT LENGTH. This is set at 100 m.

3.2 Testing a Section

This profilograph will simultaneously test both the outer and inner wheel paths. Only the PrI of the outer wheel path is necessary unless it fails the PrI specification but both are recorded anyway. In this case, the PrI is the average of the two wheel paths.

1. To record a test section, assemble the apparatus according to the Pavset manual and start the computer program.
2. Ensure that all current safety regulations are followed.
3. Click "Go to" and "Trace Recorder"
4. To view location notes, click "View" and "Location Notes". This allows the operator to enter miscellaneous project data.

NOTE: These notes must be entered before profiling. Any attempt to change them later makes printing the results difficult. The results and notes are read-only after the document has been saved.

5. To record a run, pull the profilograph into position.

6. Click the "Start Recording" button.
7. Enter the current station and whether they are increasing or decreasing. "Ready" should appear and you may begin pulling.
8. If you wish to adjust stations, stop the profilograph and click adjust station.
9. When the end is reached, click "end Recording" and save the run.
10. File names are saved in a time and date format.

Example: 04161544.97 means April 16, 1997 at 3:44 PM

11. If you go back to the Trace Viewer you can see the trace.
12. When a section to be tested does not begin or end on a 100 m station, there will be an overlap in the testing.

EXAMPLE: The section to be tested is 0+140 to 2+100. The first run would be from 0+140 to 0+240. The second run would be from 0+200 to 2+100.

13. Print the profilograms of all sublots from the computer and properly describe and label the prints.
14. All bumps and dips on the profilogram print shall be checked and identified with the bump template. Must Grind/Must Fill areas are identified on a separate report. This report can only be used locate potential bumps or dips as they must be checked on the profilogram using the bump/dip template, as some of these bumps or dips may not exceed the specification requirements.

3.2.1 Bump Locations

Due to the profilograph design the profilograph trace may show a bump as a dip/bump/dip (dips will produce the opposite effect). In both these cases the leading/trailing bump or dip was caused by the front of the profilograph following the actual profile while the trace records the centre sensing wheel position in relation to the frame. Therefore, to ensure proper identification of bumps or dips the profilograph traces must be manually reviewed. ATT 59, Part II, outlines this procedure.

Once a list of bumps and dips is compiled and repairs completed the sublots must be retested to determine final subplot PrI and the number bumps or dips in need of further repair.

4.0 HINTS AND PRECAUTIONS

1. Ensure that the beginning and end stations have been properly entered or you will get unusual and incoherent output.

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4.0 (Hints and
Precautions)

2. Be sure to follow all recommended safety precautions.
3. Refer to ATT 59 Parts I & II, for reporting and general profilograph operation.