

Experiment No. 07: PENETRATION VALUE OF BITUMEN

BACKGROUND

This is the most widely used method of measuring the consistency of a bituminous material at a given temperature. It is a means of classification rather than a measure of quality. (The engineering term consistency is an empirical measure of the resistance offered by a fluid to continuous deformation when it is subjected to shearing stress). The consistency is a function of the chemical constituents of a bitumen, viz. the relative proportions of asphaltenes (high molecular weight, responsible for strength and stiffness), resins (responsible for adhesion and ductility) and oils (low molecular weight, responsible for viscosity and fluidity). The type and amount of these constituents are determined by the source petroleum and the method of processing at the refinery.

The penetration of a bituminous material is the distance in tenths of a mm, that a standard needle would penetrate vertically, into a sample of the material under standard conditions of temperature, load and time.

OBJECTIVE

To examine the consistency of a sample of bitumen by determining the distance in tenths of a millimetre that a standard needle vertically penetrates the bitumen specimen under known conditions of loading, time and temperature.

REFERENCE

Penetration of bitumen as per IS: 1203 - 1978.

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APPARATUS REQUIRED

- i) Penetrometer
- ii) Water bath
- iii) Bath thermometer - Range 0 to 44°C, Graduation 0.2°C

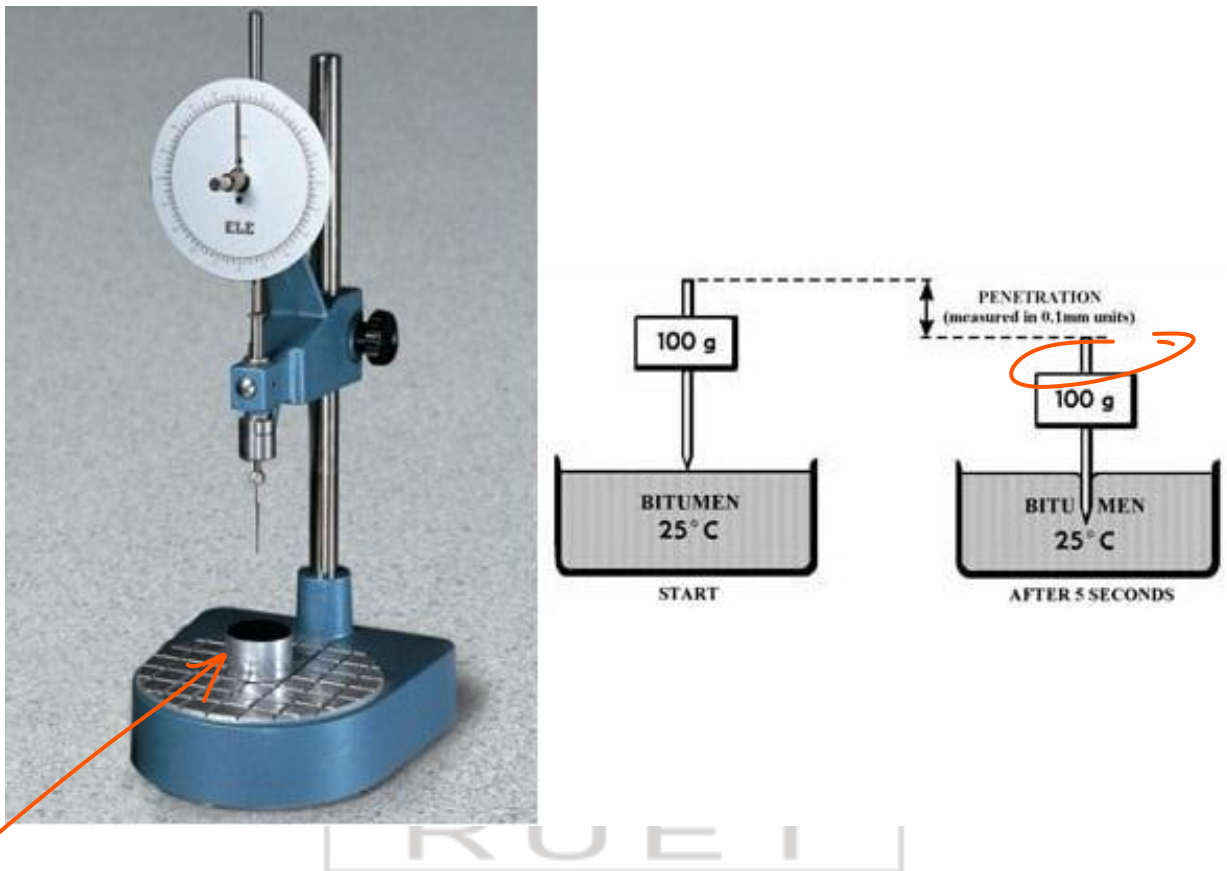


Figure 7.1: Penetration value of bitumen test apparatus

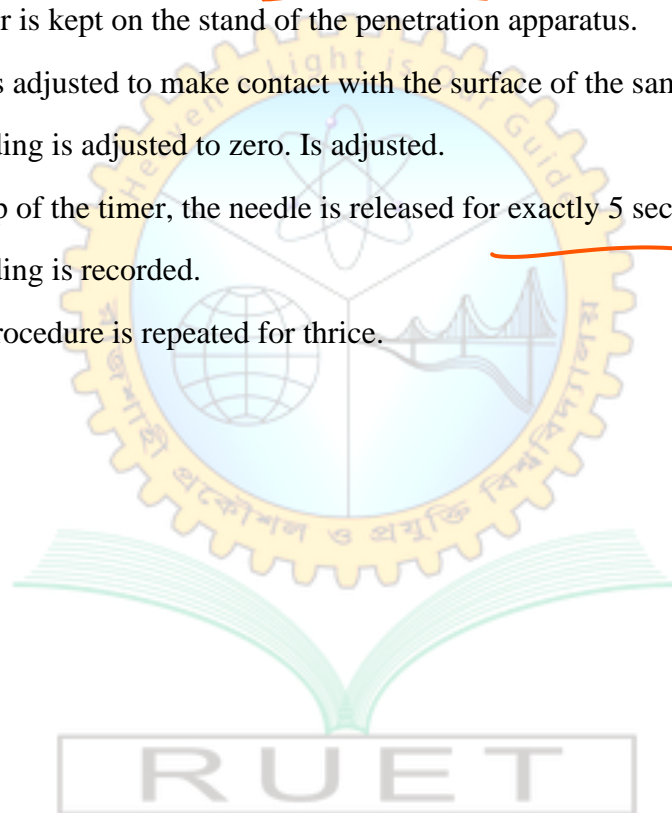
SAMPLE

Bitumen should be just sufficient to fill the container to a depth of at least 15mm in excess of the expected penetration.

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PROCEDURE

- a) The bitumen above the softening point (between 75 and 100°C) is softened. It is stirred thoroughly to remove air bubbles and water.
- b) It is poured into a container to a depth of at least 15mm in excess of the expected penetration.
- c) It is cooled at an atmospheric temperature of 15 to 30°C for 21 hrs. Then it is placed in a transfer dish in the water bath at $25.0 \pm 0.1^\circ\text{C}$.
- d) The container is kept on the stand of the penetration apparatus.
- e) The needle is adjusted to make contact with the surface of the sample.
- f) The dial reading is adjusted to zero. Is adjusted.
- g) With the help of the timer, the needle is released for exactly 5 seconds.
- h) The dial reading is recorded.
- i) The above procedure is repeated for thrice.



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OBSERVATION SHEET:

Pouring temperature: 

Period of cooling in atmosphere:

Period of cooling in water bath:

Room temperature:

Duration of releasing the penetration needle:

Test temperature:

Penetrometer dial reading	Test 1	Test 2	Test 3
Initial			
Final			
Penetration Value			

RESULTS REPORTING



CONCLUSION

