

## DEPARTMENT OF CIVIL ENGINEERING

### DETERMINATION OF DUCTILITY

#### DEFINITION

The ductility of bituminous material is the distance in centimeters to which it will elongate before breaking when a briquette specimen of the materials is pulled at a specified speed and at specified temperature.

#### APPARTUS

1. Testing machine
2. Mould made up of brass
3. Water bath preferably with a thermostat, 10lit capacity and maintained with in  $0.1^{\circ}\text{C}$  of the specified temperature
4. Thermometer  $250^{\circ}\text{C}$  capable of reading up to  $0.01^{\circ}\text{C}$ .

#### STANDARD

- IS: 208-1978.

#### PROCEDURE

1. Unless otherwise specified this test shall be conducted at a temperatures of  $27 \pm 0.5^{\circ}\text{C}$  and at a rate of pull of  $50 \pm 2.5\text{mm /min}$ .
2. Melt the bitumen to be tested to a temperature of 75 to  $100^{\circ}\text{C}$  above its approximate softening point till it becomes fluid.
3. Assemble the mould on a brass plate and coated on all the sides with a mixture glycerin and dextrin of equal parts to avoid sticking of the material.
4. Fill the mould until it is more than level full.
5. In filling the mould, pour the material in a thin stream back and forth from end to end of the mould.
6. Leave it to cool room temperature for 30 to 40 minutes and than place it in water bath maintained at a specific temperature for 30 minutes.
7. Cut off excess bitumen by means of hot straight edged putty knife level full.
8. Place the brass plate and mould with briquette specimen, in the water-bath and

keep at the specified temperature for about 85 to 95 minute

9. Remove the briquette from the plate, detach sidepieces and test the briquette immediately.
10. While the test is being conducted, make sure that the water in the tank of the testing machine covers the specimen above by at least 25mm and is maintained continuously within  $\pm 0.5^{\circ}\text{C}$  of specified temperature.
11. Attach rings at each end of the clips to the hooks in the testing machine and pull the two clips apart horizontally at a uniform speed as specified until the briquette ruptures.
12. Measure the distance in centimeters through which the clips have been pulled to produce rupture.
13. At least three determinations shall be made for each test.



Fig-1 Ductility Test

## **OBSERVATION**

1. Report the average of three normal tests as ductility of the sample, provided that, the three determinations be with in  $\pm 5\%$  of their mean value.
2. If the value of three determinations do not lie with in  $\pm 5\%$  of their mean but the two higher value are with in  $+ 5\%$  of their mean, then record the mean of the two higher values as the test result.

## **PRECISION**

- The duplicate test results should not differ by more than the values given below:-

Repeatability	Reproducibility
10% of mean	20% of mean

## **PRECAUTION**

1. In filling the mould care shall be taken to see that no air bubbles shall be formed, and not to disarrange the parts and thus distorting the briquette.