

Flash and Fire Point Test: Cleveland Open Cup Method

- Flash and Fire Point Test is a safety test.
- The flash point is one measure of the tendency of the test specimen to form a flammable mixture with air under controlled laboratory conditions.
- Flash point is used in shipping and safety regulations to define flammable and combustible materials.

- Every liquid has a vapor pressure, which is a function of that liquid's temperature.
- As the temperature increases, the vapor pressure increases.
- As the vapor pressure increases, the concentration of vapor of the flammable liquid in the air increases.
- Hence, temperature determines the concentration of vapor of the flammable liquid in the air.

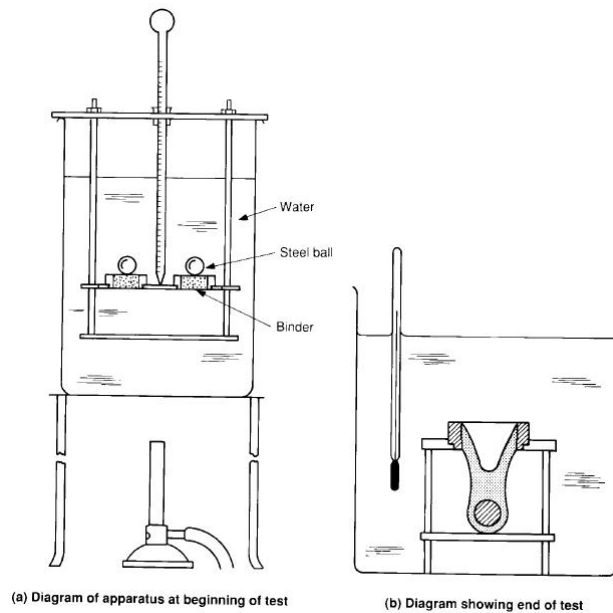
Flash Point: the lowest liquid temperature at which application of the test flame causes the vapors of the sample to ignite.

Fire Point: the temperature at which the test flame causes the sample to ignite and remain burning for at least 5 seconds.

- First, the test cup is filled with a portion of the asphalt.
- Then, the temperature of this chemical is increased rapidly and then at a slow, constant rate.
- The increase in temperature will cause the chemical to begin to produce flammable vapor in increasing quantities and density.
- A small test flame passing over the surface of the liquid causes the vapor to ignite at the flash point.
- The test flame produces at least five continuous seconds of ignition at the fire point.

Softening Point: Ring and Ball Test

- Bituminous materials do not have a definite melting point.
- Instead, as the temperature rises, these materials slowly change from brittle or very thick and slow-flowing materials to softer and less viscous liquids.
- The softening point is defined as the temperature at which a bitumen sample can no longer support the weight of a 3.5-g steel ball.
- Two horizontal disks of bitumen, cast in shouldered brass rings, are heated at a controlled rate in a liquid bath while each supports a steel ball.
- The softening point is reported as the mean of the temperatures at which the two disks soften enough to allow each ball, enveloped in bitumen, to fall a distance of 25 mm (1.0 inch).



- A high softening point ensures that asphalt will not flow in service.
- For a given penetration, the higher the softening point the lower the temperature sensitivity.
- Together with the penetration at 25 °C, it can be used to compute the Penetration Index.