Highway Materials Laboratory		
S.No	**Name of the Equipment**	**Purpose of Use**
1	**Impact Testing Machine** The aggregate impact test is carried out to evaluate the resistance to impact of aggregates. Aggregates to be used **for wearing course**, the impact value **shouldn't exceed 30 percent**. For **bituminous macadam** the **maximum** permissible value is **35 percent**. For **Water bound macadam** base courses the maximum permissible value defined by IRC is **40 percent.**	
2	**Los Angeles Abrasion Testing Machine** Abrasion test is carried out to test the hardness property of aggregates and to decide whether they are suitable for different pavement construction works. Los Angeles abrasion test is a preferred one for carrying out the hardness property and has been standardized in India (**IS: 2386 part-IV**). The principle of Los Angeles abrasion test is to find the percentage wear due to relative rubbing action between the aggregate and steel balls used as abrasive charge. A maximum value of **40 percent** is allowed for **WBM base course** in Indian conditions. or **bituminous concrete**, a maximum value of **35 percent** is specified.	
3	**Aggregate Crushing Value Apparatus** One of the model in which pavement material can fail is by crushing under compressive stress. A test is standardized by **IS: 2386 part-IV** and used to determine the crushing strength of aggregates. The aggregate crushing value provides a relative measure of resistance to crushing under gradually applied crushing load. A value **less than 10** signifies an exceptionally **strong aggregate** while **above 35** would normally be regarded as **weak aggregates**.	
4	**Length Gauge** The particle shape of the aggregate mass is determined by the percentage of flaky and elongated particles in it. Aggregates which are flaky or elongated are detrimental to higher workability and stability of mixes. The **elongation index** of an aggregate is defined as the percentage by weight of particles whose **greatest dimension (length) is 1.8 times their mean dimension**. This test is applicable to aggregates larger than 6.3 mm. Elongation gauge (see Fig-5) is used for this test. This test is also specified in (**IS: 2386 Part-I**). However there are no recognized limits for the elongation index.	
5	**Thickness Gauge** The particle shape of the aggregate mass is determined by the percentage of flaky and elongated particles in it. Aggregates which are flaky or elongated are detrimental to higher workability and	

	stability of mixes. The **flakiness index** is defined as the percentage by weight of aggregate particles whose **least dimension is less than 0.6 times their mean size**. Flakiness gauge (see Fig-4) is used for this test. Test procedure had been standardized in India (**IS: 2386 part-I**).	
6	**Penetrometer Test** The penetration value of bitumen is measured by distance in tenths of mm that a standard needle would penetrate vertically into bitumen sample under standard conditions of test. By this test we can determine the hardness or softness value of bitumen.	
7	**Ductility Testing Machine** The property of bitumen which allows it to undergo deformation or elongation is called ductility of bitumen. The ductility of bitumen is measured by the distance in Cm (centimeter), to which the bitumen sample will elongate before breaking when it is pulled by standard specimen at specified speed and temperature. The minimum value should be 75cm.	
8	**Ring & Ball Apparatus** The determination of softening point helps to know the temperature up to which a bituminous binder should be heated for various road use applications. Higher softening point ensures that they will not flow during service. Higher the softening point, lesser the temperature susceptibility. Bitumen with higher softening point is preferred in warmer places.	
9	**Flash and Fire Point Test** Flash point of bitumen is defined as the point of lowest temperature at which bitumen catches vapors of test flame and fires in the form of flash. Fire point of bitumen is defined as the point of lowest temperature at which the bitumen ignites and burns at least for 5 second under specific conditions of test. Flash and fire point test helps to control fire accidents in bitumen coated areas. By this test we can decide the bitumen grade with respect to temperature for particular areas of high temperatures.	

10	**Bitumen Extractor** Bitumen Extraction Test is used to determine the percentage of bitumen content present in the asphaltic pavement by cold solvent extraction. The properties of flexible pavement such as durability, compatibility, and resistance from defects bleeding, raveling, and aging of flexible pavement are majorly dependent on the percentage of bitumen used with the aggregate to lay the pavement.	
11	**Pycnometer Bottle** The specific gravity of aggregates are important properties that are required for the design of concrete and bituminous mixes. The specific gravity of a solid is the ratio of its mass to that of an equal volume of distilled water at a specified temperature. Because the aggregates may contain water-permeable voids, the measure of specific gravity of aggregates is necessary. The specific gravity of aggregates normally used in road construction ranges from about 2.5 to 2.9.	
12	**Marshal Stability Testing Machine** Bituminous concrete mix is commonly designed by Marshall Method. This test is extensively used in routine test programmes for the paving jobs. The stability of the mix is defined as a maximum load carried by a compacted specimen at a standard test temperature of 60^0C. The flow is measured as the deformation in units of 0.25 mm between no load and maximum load carried by the specimen during stability test This test attempts to get the optimum binder content for the aggregate mix type and traffic intensity.