2. LOS ANGLES ABRASION VALUE TEST.
(IS : 2386 – PART – 4)

INTRODUCTION:

Due to the movement of traffic, the road stones used in the surfacing course are subjected to wearing action at the top. Resistance to wear or hardness is hence an essential property for road aggregates, especially when used in wearing course. Thus road stones should be hard enough to resist the abrasion due to the traffic. When fast moving traffic fitted with pneumatic tyres move on the road, the soil particles present between the wheel and road surface causes abrasion on the road stone. Steel tyres of animal drawn vehicles, which rub against the stones, can cause considerable abrasion of the stones on the road surface. Hence in order to test the suitability of road stones to resist the abrading action due to traffic.

Object:

To determine the aggregates abrasion test by Los Angles Abrasion method.

L.A. abrasion testing equipment

Apparatus:

a)Los Angles Abrasion Machine: The Los Angles Machine consists of a hollow steel cylinder, closed at both ends, having an inside diameter 700mm and an inside length of 500mm, mounted on stub shafts about which it rotates on a horizontal axis, and rotating arrangement for speed of 30 to 33 revolutions per minute. An opening is provided in the cylinder for the introduction of the test sample. A removable cover of the opening is provided in such a way that when closed and fixed by bolts and nuts, it is dust-tight and the interior surface is perfectly cylindrical. A removable steel shelf projecting radially 88mm in to the cylinder and extending to the full length of it, is mounted on the interior surface of the cylinder rigidly, parallel to the axis. The shelf is fixed at a distance of 1250mm from the opening, measured along the circumference in the direction of rotation. Abrasion charge, consisting of cast iron spheres approximately 48mm in diameter and 390 to 445gm in weight are used.
b) Balance -10 kg capacity – sensitivity 0.1 gm.
c) Test Sieve – 1.70 mm IS sieve.
d) Oven.

Procedure:

Clean aggregates dried in an oven at 105 – 110^{0}C to constant weight, confirming to any one of the grading A, to G, is used for test. The grading or gradings used in the test should be nearest to the grading to be used in the construction. Aggregates weighing 5 kg for gradings A, B, C or D and 10 kg for gradings E, F or G may be taken as test specimen and placed in the cylinder. The abrasion charge is also chosen, depending on the grading of the aggregate and is placed in the cylinder of the machine. The cover is then fixed dust-tight. The machine is rotated at a speed of 30 to 33 revolutions per minute.

The machine is rotated for 500 revolutions for gradings A, B, C and D, for gradings E, F and G, it shall be rotated for 1000 revolutions. The machine should be balanced and driven in such a way as to maintain uniform peripheral speed.

After the desired number of revolutions, the machine is stopped and the material is discharged from the machine taking care to take out entire stone dust. Using a sieve of size 1.70mm IS sieve, the material is first separated into two parts and the finer portion is taken out and sieved further on a 1.70mm IS sieve. The portion of material coarser than 1.70mm size is washed and dried in an oven at 105 – 110^{0}C to constant weight and weighed correct to one gram.

Calculations:

The difference between the original and final weights of the sample is expressed as a percentage of the original weight of the sample is reported as the percentage wears.

$$\text{Loa Angles Abrasion Value} = \frac{(W1 - W2)}{W1} 100$$

Where, W1 = Original weight of the sample.
W2 = Weight of aggregate retained on 1.70mm IS sieve.
(W1 – W2) = Los in weight due to wear.

Results:

The result of the Los Angles Abrasion is expressed as a percentage wear and the average value of three tests.

Limits:

Loa Angles Abrasion for road aggregates = Maximum 40%.

Types of Grading and Abrasion charges:

Grading	Weight in grams of each test sample in size range, mm (Passing nd retained on square holea)										Abrasion charge	
	80 to 63	63 to 50	50 to 40	40 to 25	25 to 20	20 to 12.5	12.5 to 10	10 to 6.3	6.3 to 4.75	4.75 to 2.36	Number of spheres	Weight of charge, gm
A	-	-	-	1250	1250	1250	1250	-	-	-	12	5000+/-25
B	-	-	-	-	-	2500	2500	-	-	-	11	4584+/-25
C	-	-	-	-	-	-	-	2500	2500	-	8	3330+/-20
D	-	-	-	-	-	-	-	-	-	5000	6	2500+/-15
E	2500	2500	5000	-	-	-	-	-	-	-	12	5000+/-25
F	-	-	5000	5000	-	-	-	-	-	-	12	5000+/-25
G	-	-	-	5000	5000	-	-	-	-	-	12	5000+/-25

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FORM D12

Punjab State Road Sector Project
PWD B&R Branch, Govt. of Punjab
Punjab Roads & Bridges Development Board

ABRASION TEST BY USE OF THE LOS ANGELES MACHINE
(IS 2386 Part – 4)

Contract : PSRSP/WB/UG1/ICB

Date Sampled : _____

Kind of Material : _____

Date Tested : _____

Source : _____

Quantity Represented : _____

Passing	Retained On	Grading and Weight in gm of Test Sample			
		A	B	C	D
37.5	25.0	1250±25	------	------	------
25.0	19.00	1250±25	-------	-------	------
19.0	12.50	1250±25	1250±25	-------	------
12..5	9.5	1250±25	1250±25	-------	-------
9.5	6.3	------	--------	1250±25	------
6.3	4.75	-------	-------	1250±25	-------
4.75	2.36	-------	------	-------	5000±25
TOTAL		5000±25	5000±25	5000±25	5000±25

Note: The test sample shall conform to one of the grading in the above table.

SPEED	GRADING	NO. OF SPHERES	WEIGHT OF CHARGE, gm
Rotate at 30 to 33 rpm for 500 revolu-tions.	A	12	5000±25
	B	11	4584±25
	C	8	3330±20
	D	6	2550±15

Note: The abrasive charge shall consist of cast iron or steel spheres approximately 47.6 mm in diameter and each weigh between 390 and 445 grams. The charge depending upon grading of test sample shall be as tabulated above.

Specification's Limit	
DBM	40%
Other Works	50%

Calculations: Abrasion Loss, % = (A-B) / B x 100 = _____

Where: A = Original oven dried weight, g = _____

B = Oven dried weight retained on 1.70 mm sieve after abrasion, g = _____

Remarks: _____

Approved/Not Approved:

Contractor's Representative	Materials Engineer Consultant	Resident Engineer Consultant