MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Gwalior, Madhya Pradesh - 474005

A MINI-PROJECT REPORT

ON

"Analyzing the effect of Gradation on its Abrasion Value"

Submitted By:

Mohit Rathore	0901CE201071
Mohit Shrivastav	0901CE201072
Neelesh Bouddh	0901CE201073
Neetesh Verma	0901CE201074
Neha Sisodiya	0901CE201075
Nikita Mourya	0901CE201076
Paras Dubey	0901CE201078
Paresh Buriya	0901CE201079
Piyush Singh Parihar	0901CE201080
Prabhat Vyas	0901CE201081

Department of Civil Engineering

Madhav Institute of Technology & Science, Gwalior

CERTIFICATE

This is to certify that the project entitled "**Analyzing the effect of gradation on its abrasion value**" presented by the students of group-8 in complete satisfaction of the necessity of the recompense of Bachelor of Technology degree in Civil Engineering at Madhav Institute of Technology & Science, Gwalior is a genuine work completed by the students under my watch and direction.

To the best of my insight, the matter epitomized in the theory has not been submitted to any other college/Institute for the recompense of any Degree or Diploma.

Under the Guidance of-

Dr. Jayvant Chaudhary

M. K. Gaur Sir

Department of Civil Engineering

Dr. M.K. Trivedi

Head

Department of Civil Engineering

Dated:

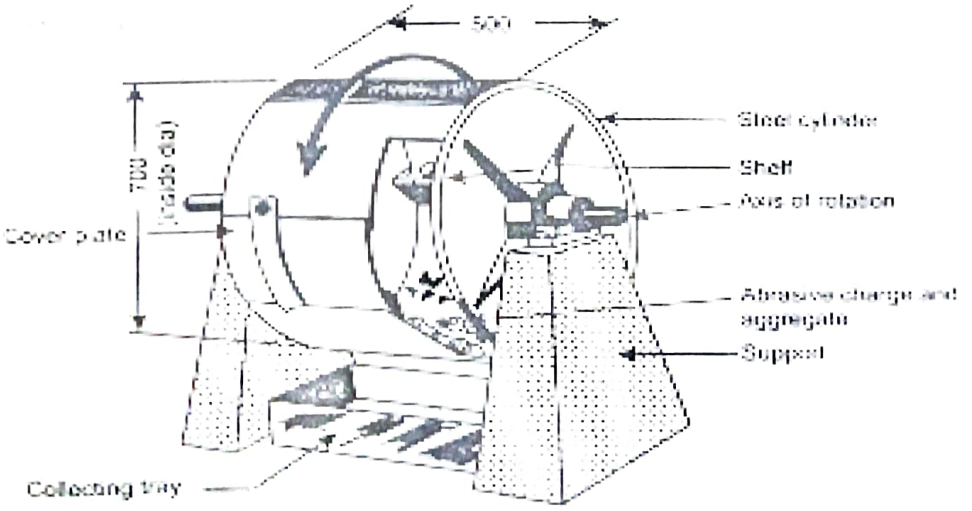
CONTENT

Introduction

To analyse the effect of aggregate gradation on its abrasion value, we'll perform the Los Angeles Abrasion experiment that determine the abrasion value of coarse aggregates by using the Los Angeles testing machine with an abrasion charge.

In this test, aggregates undergo significant wear and tear in the Loss Angeles machine that will provide us the aggregates that have good toughness and abrasion resistance values as per IS : 2386 (part -4) 1963.

Los Angeles abrasion test on aggregates is the measure of aggregates toughness and abrasion resistance such as crushing, degradation and disintegration.



Objective

To analyze the effect of aggregate gradation on its abrasion value using Los Angeles abrasion value test.

Method Adopted

In order to determine the hardness or resistance to wear and tear, the abrasion test is carried out by any one of the following three methods:

- Deval abrasion test
- Dory abrasion test
- Los Angeles abrasion test

It may be mentioned that the Los Angeles test is the most commonly used method for abrasion test as its results have been correlated with the performance studies.

The principle of Los Angeles abrasion test is to find the percentage of wear due to relative rubbing action between the aggregate and steel balls used as abrasive charge.

Apparatus used in this test are:

- Los Angeles abrasion machine
- Abrasive charges
- Sieves (sieves required are 80,63,50,40,25,12.5,10,6.3,4.75, 2.36 and 1.7 mm as per gradation of aggregates) and mechanical sieve shaker machine
- weighing machine having capacity up to 15kg
- Trowel
- Drying oven

Procedure

1. Select the grading to be used in such a way that it conforms to the grading to be used in construction to the maximum extent possible.

Gradings of Test Samples

Sieve Size (Square Hole)		Weight in gram of Test Sample for Grade						
Passing (mm)	Retained on (mm)	A	B	C	D	E	F	G
80	63	-	-	-	-	2500*	-	-
63	50	-	-	-	-	2500*	-	-
50	40	-	-	-	-	5000*	5000*	-
40	25	1250	-	-	-	-	5000*	5000*
25	20	1250	-	-	-	-	-	5000*
20	12.5	1250	2500	-	-	-	-	-
12.5	10	1250	2500	-	-	-	-	-
10	6.3	-	-	2500	-	-	-	-
6.3	4.75	-	-	2500	-	-	-	-
4.75	2.36	-	-	-	5000	-	-	-

*Tolerance of ±2 percent permitted.

Table 1- Grading of test sample

Grading	Number of spheres	Weight of charge (gm)
A	12	5000 ± 25
B	11	4584 ± 25
C	8	3330 ± 20
D	6	2500 ± 15
E	12	5000 ± 25
F	12	5000 ± 25
G	12	5000 ± 25

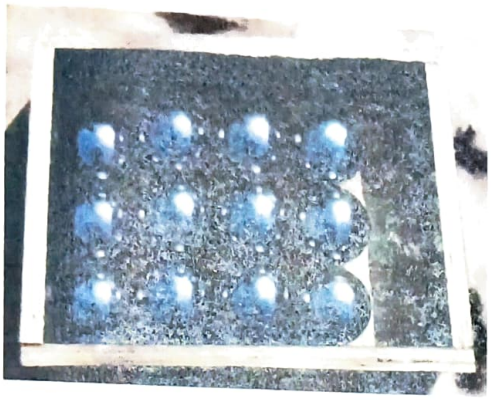
Table 2-Selection of abrasive charge

2. Take 5 kg of sample for grading A, B, C & D and 10 kg for grading E, F & G.

3. Choose the abrasive charge as per Table 2 depending on grading of aggregates.

4. Place the aggregates and abrasive charge in the cylinder and fix the cover.

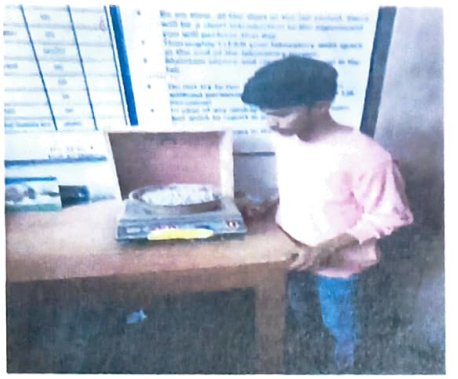
5. Rotate the machine at a speed of 30 to 33 revolutions per minute. The number of revolutions is 500 for Grading A, B, C & D and 1000 for grading E, F & G. The machine should be balanced and driven such that there is uniform peripheral speed.



6. The machine is stopped after the desired number of revolutions and material is discharged to a tray.

7. The entire stone dust is sieved on 1.70 mm IS sieve.

8. The material coarser than 1.7mm size is weighed correct to one gram.



Observation & Calculation

The difference between the original and final weight of the sample represents the actual wear that has taken place and this value is expressed as a percentage of the original weight of the sample and is reported as the percentage wear.

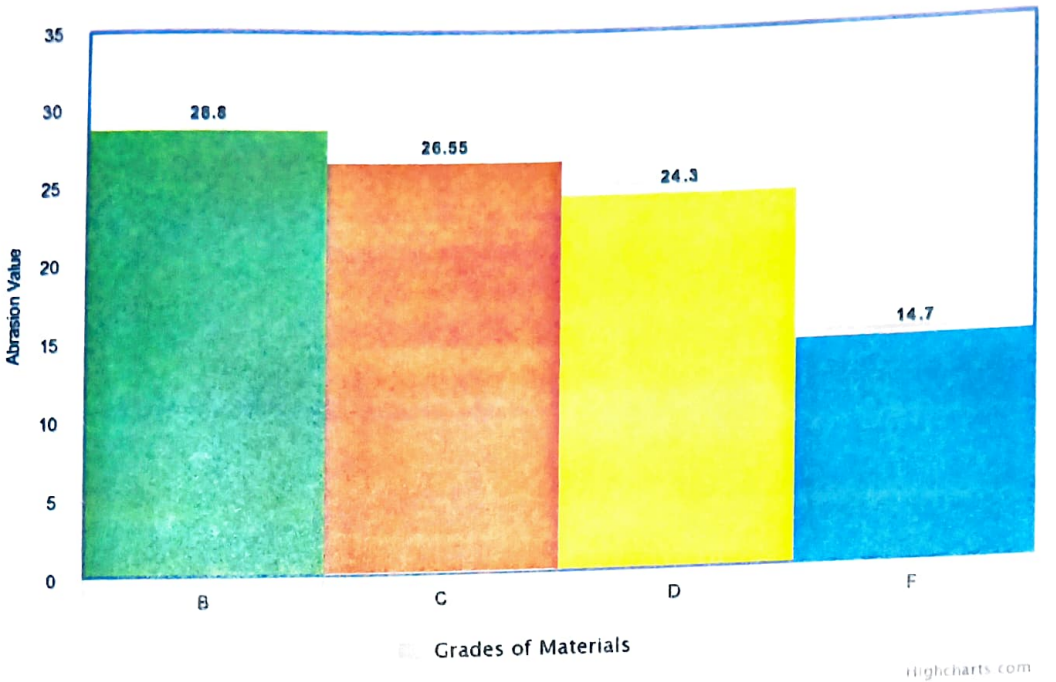
Let the original weight of aggregate = W_1

Weight of aggregate retained on 1.70 mm sieve = W_2

Loss in weight due to wear, g = $(W_1 - W_2)$ g

Abrasion Value = $(W_1 - W_2 / W_1) * 100$

S. No.	Grade of material	Sample passing through IS sieve (in gm)	Sample retained on IS sieve (in gm) (w_2)	Original weight taken (in gm) (w_1)	No. of charges	Abrasion value = ($w_1 - w_2 / w_1$) * 100
1.	B	1440	3560	5000	10	28.8%
2.	C	1327.5	3672.5	5000	8	26.55%
3.	D	1215.9	3784.1	5000	6	24.3%
4.	F	1470	8530	10000	12	14.7%



Result & Conclusion

The abrasion value of aggregates of grade B, C, D and F, respectively, are 28.8%, 26.55%, 24.3%, 14.7%.

The results indicate that as we take higher grade (coarser) aggregates, the abrasion value will significantly decrease i.e. as the aggregate gets coarser, it becomes tougher and has higher abrasive resistance.

References

1. Bureau of Indian standard, Indian standard method of test for aggregates for concrete, Mechanical properties IS: 2386(part 4)

2. Bureau of Indian standards, Indian standard specification of course and fine aggregates from natural sources for concrete, IS:383- 1997.
3. https://ts-nitk.vlabs.ac.in/exp/los-angeles-abrasion/procedure.html.
4. https://morth.nic.in/