iJETRM
International Journal of Engineering Technology Research & Management
Published By:
https://www.ijetrm.com/

STUDY OF CONCRETE MADE USING FLY ASH AGGREGATES

SHAMSUZZOHA
MR MOHD SHOEB ALAM (ASSISTANT PROFESSOR)
Structure Engineering (MTech) Department of Civil Engineering,
Al-Falah University HaryanaFaridabad-121004

ABSRACT
Many researchers have been executed within the vicinity of fly ash usage in the past. It in particularly concentrated on alternative of cement with fly ash but production of artificial aggregates with fly ash helps in using massive volume of ash in concrete. The sector is lots interested in this part currently due to this massive scale utilization which additionally reduces environmental pollution and dwindling of natural assets.This paper particularly makes a specialty of manufacturing system of light weight aggregates the usage of pelletizer and curing has been carried out in cold bonded technique. The properties of these fly ash aggregates have been tested and in comparison, with natural gravel and the study shows at suggest that cold bonded fly ash aggregates may be used as an aggregate replacement material in concrete. The strength property and density of concrete made with artificial fly ash aggregates and natural gravel have been additionally studied which confirms that creation of fly ash aggregates in concrete reduces the compressive strength however meets the desired strength for use as a structural material.

INTRODUCTION
In growing need for electricity in India, 70% of power is generated through thermal power plants. The environmentaldreads from these plants include air pollution due to particulate emission, water pollution and shortage of land for dumping the fly ash. Further, the poor quality of Indian coal has high ash content, which worsens the disposal problem.Fly ash generation is estimated to be around 200 million tons in 2013 -2014. Instead of dumping the fly ash as landfills,fly ash is widely used as cement replacement material, pavement base, blocks etc., in these days. To use fly ash in large volume the applications like embankment fill or aggregate replacement material should be considered. Construction industry is growing very fast manner. The availability of raw materials for the construction is facing many problems in most of the world. The continuous usage of natural resources for the production of the concrete insome locations creates many threatens to the environmental conditions. Researchers have carried out extensive workon this area are trying for new alternative materials for this deficiency in the construction industry.

LITERATURE REVIEW
Joseph and Ramamurthy determined the fresh and hardened properties of concrete made using cold bonded fly ash aggregate. The cement content of 250 and 450 kg/m3 is used for the preparation of concrete. The variables consideredare cement content, water cement ratio and aggregate ratio. It is found that the compacted density of concrete reduceswith increase of in volume fraction of cold bonded fly ash aggregate. The workability of concrete is found to be controlled by content of cold bonded aggregate. The test results indicate that the strength of the concrete increases with increase

iJETRM
International Journal of Engineering Technology Research & Management
Published By:
https://www.ijetrm.com/

cement content. The failure of concrete is found to be controlled by aggregate fracture.
Joseph and Ramamurthy studied the influence of high volume of fly ash in concrete containing cold bonded fly ash aggregate. The replacement ratio of cement with fly ash is 10, 30 and 50 percent is used. The coarse aggregate ratio of 50 and 65 percent is used. The fresh density of concrete reduces with increase in replacement of cement with fly ash and cold bonded aggregate ratio. The workability of concrete is increases with increase in fly ash content.

SOME TESTS PERFORMED FOR AGGREGATE STRENGTH ARE:-

Aggregate Impact Value Test

The purpose of the test is to know the toughness i.e. the resistance of the aggregate to impact and thus to decide its suitability for use in concrete.

Toughness is the property of material which indicates Its capacity to withstand impact or sudden shock. Tougher the aggregate, more suitable it is for use in Concrete, especially for wearing surfaces such as road Surface which is often subjected to load impacts. Toughness is different from compressive strength Which is resistance against slow sustained load. Aggregate impact value is a measure of toughness of Aggregate. Lower the impact value, stronger the Aggregate against impact. Therefore, for good quality Concrete, aggregate with lower AIV is preferred.

Procedure:

i. Prepare test sample, by sieving the given Aggregate. The sample shall pass through 12.5 mm sieve and retained on 10 mm sieve,
ii. Dry the sample in an oven at a temperature Between 100°C to 110°C, for four hours. Then Allow it to cool.
iii. Fill the cylindrical measure in layers taking care To tamp each layer by a tamping rod. Strike off the top with the rod. Find out weight of this Sample [W].
iv. Remove the sample from the measure and fill it In the metal cup fixed to base plate. Tamp it with 25 strokes.
v. Raise the hammer till its lower face is 380 mm Above upper surface of the sample and allow it to Fall freely on the sample. Give similar 15 blows At an interval of not less than one second.
vi. Remove the crushed aggregate from the cup and Sieve it through 2.36 mm sieve, Weigh the Fraction passing the 2.36 mm sieve [Wl]

iJETRM
International Journal of Engineering Technology Research & Management
Published By:
https://www.ijetrm.com/

Aggregate Abrasion Value Test

Apart from testing the aggregate with respect to its Crushing value and impact resistance, the aggregates Must be tested with respect to its resistance to wear When used in construction of roads, pavements and Wear house floors. I.S 2386 (Part IV) covers two Methods for finding out the abrasion value of coarse Aggregate namely Deval and Los Angeles abrasion Testing machine. However, use of Los Angeles Abrasion testing machine gives a better realistic Picture of the abrasion resistance of the aggregate. Following are the guidelines for grading of the test Sample and specifications for the abrasive charge to Be used for the test.

Procedure:

i. Clean the internal surface of the mold Thoroughly and place it on a smooth horizontal, Rigid and non-absorbent surface, such as of a Metal plate.
ii. Consider a W/C ratio of 0.5 to 0.6 and design Mix of proportion about 1:2:4 it is presumed that A mix is designed already for the (test). Weigh the quantity of cement, sand, aggregate and Water correctly. Mix thoroughly. Use this fresh Prepared concrete for the test,
iii. Fill the mold to about one fourth of its height With concrete. While filling, hold the mold Firmly in position,
iv. Tamp the layer with the round end of the Tamping rod with 25 strokes, disturbing the Strokes uniformlyover the cross section.

iJETRM
International Journal of Engineering Technology Research & Management
Published By:
https://www.ijetrm.com/

v. Fill the mold further in 3 layers each time by ¼ ^ height and tamping evenly each layer as Above.
vi. After completion of tamping of the topmost layer Strike of the concrete with a trowel or tamping Bar,level with the top of mold.
vii. Lift the mold vertically slowly and remove it.
viii. The concrete will subside. Measure the height of the specimen of concrete after subsidence.
ix. The slump of concrete is the subsidence, i.e. Difference in original height and height up to the Topmostpoint of the subsided concrete in Millimeters.

Aggregates passing through 12.5 mm and retained in 10 mm sieve were used for both fly ash aggregates And natural gravel for the Mechanical tests (IS 2386 (Part 4): 1963). The crushing value gives the Resistance of aggregate against gradually applied crushing load. Aggregate crushing value, impact Value and abrasion resistance were found using IS 2386 (Part 4): 1963. Specific gravity, water Absorption, bulk density and void ratio were Calculated as per IS 2386 (Part 3): 1963.

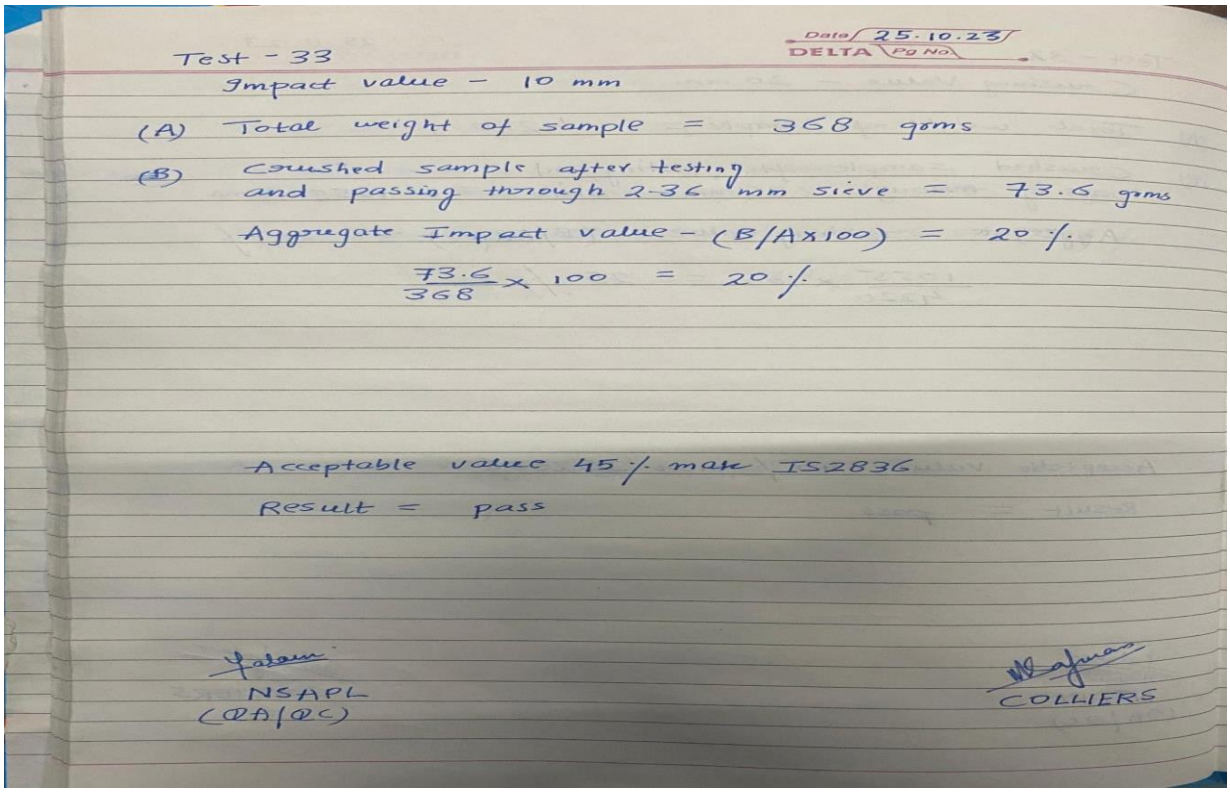
Aggregate Crushing Value Test

The purpose of the test is to have an idea of compressive strength relatively, i.e. its resistance to crushing under compressive load applied gradually and thus to decide its suitability for use in concrete.

Apparatus:

i. A steel cylinder 152 mm diameter with open ends a square base plate with 252 mm sides, a plunger with a piston of dia. 150 mm. Plunger should have a hole 20 mm dia. Across it, little distance below top to insert a rod to lift, or lower the plunger.
ii. A cylinder measures 115 mm dia. And 180 mm high.
iii. I. S. sieves 12.5 mm, 10 mm and 2.36 mm.
iv. Tamping rod 16 mm dia. 45 to 60 cm long.
v. Balance 3 kg weighing up to 1 gm.

iJETRM
International Journal of Engineering Technology Research & Management
Published By:
https://www.ijetrm.com/



Test - 33

Date 25.10.23 DELTA Pg No

Impact value - 10 mm

(A) Total weight of sample = 368 gms

(B) Crushed sample after testing and passing through 2.36 mm sieve = 73.6 gms

Aggregate Impact value - (B/A x 100) = 20 %.

$\frac{73.6}{368} \times 100 = 20\ \%$

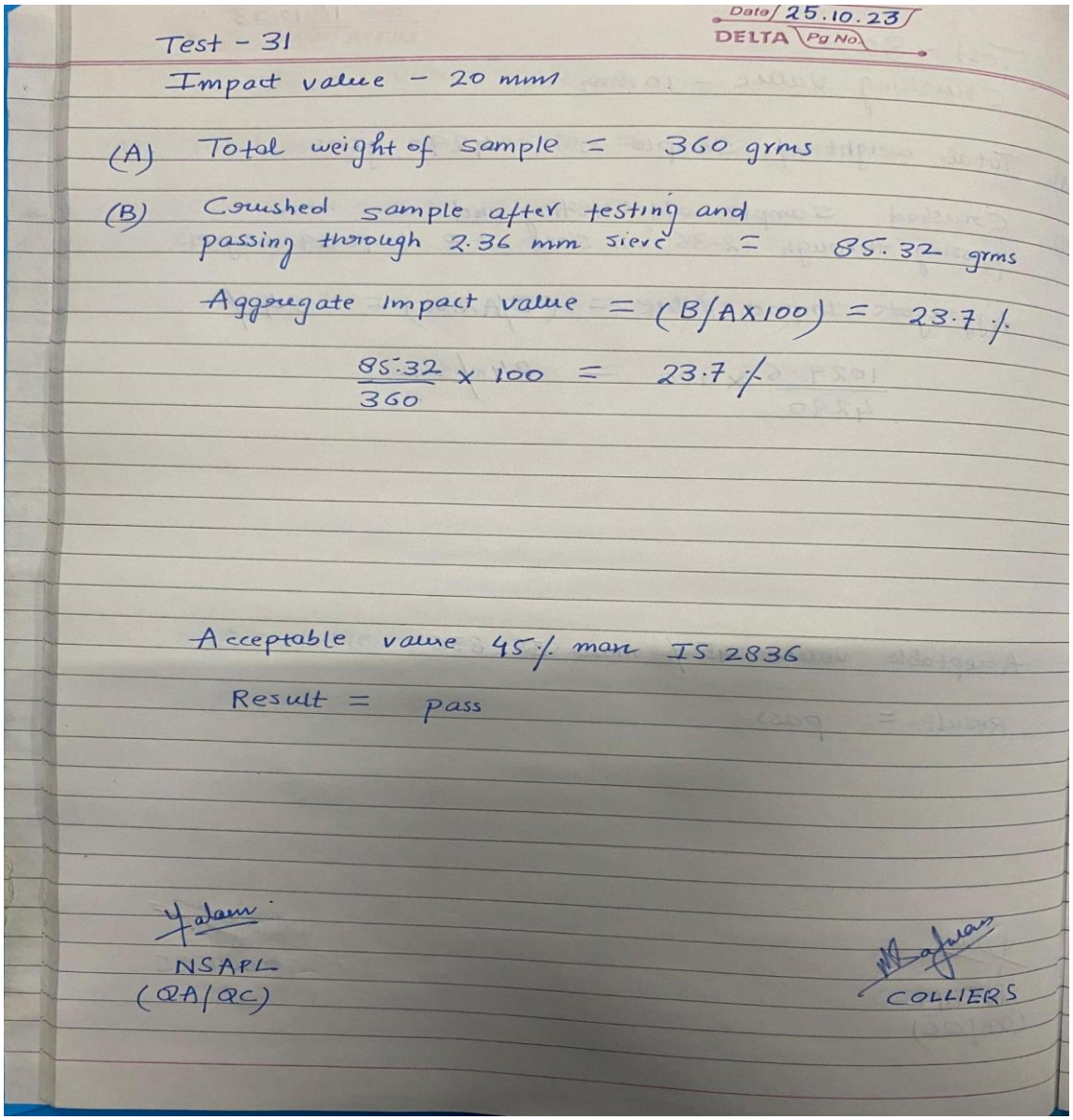
Acceptable value 45 %. max IS2836

Result = pass

NSAPL
(QA/QC)

COLLIERS

iJETRM
International Journal of Engineering Technology Research & Management
Published By:
https://www.ijetrm.com/



Test - 31

Date 25.10.23 DELTA Pg No.

Impact value - 20 mm

(A) Total weight of sample = 360 grms

(B) Crushed sample after testing and passing through 2.36 mm sieve = 85.32 grms

Aggregate Impact value = (B/AX100) = 23.7 %.

$\frac{85.32}{360} \times 100 = 23.7\ \%$

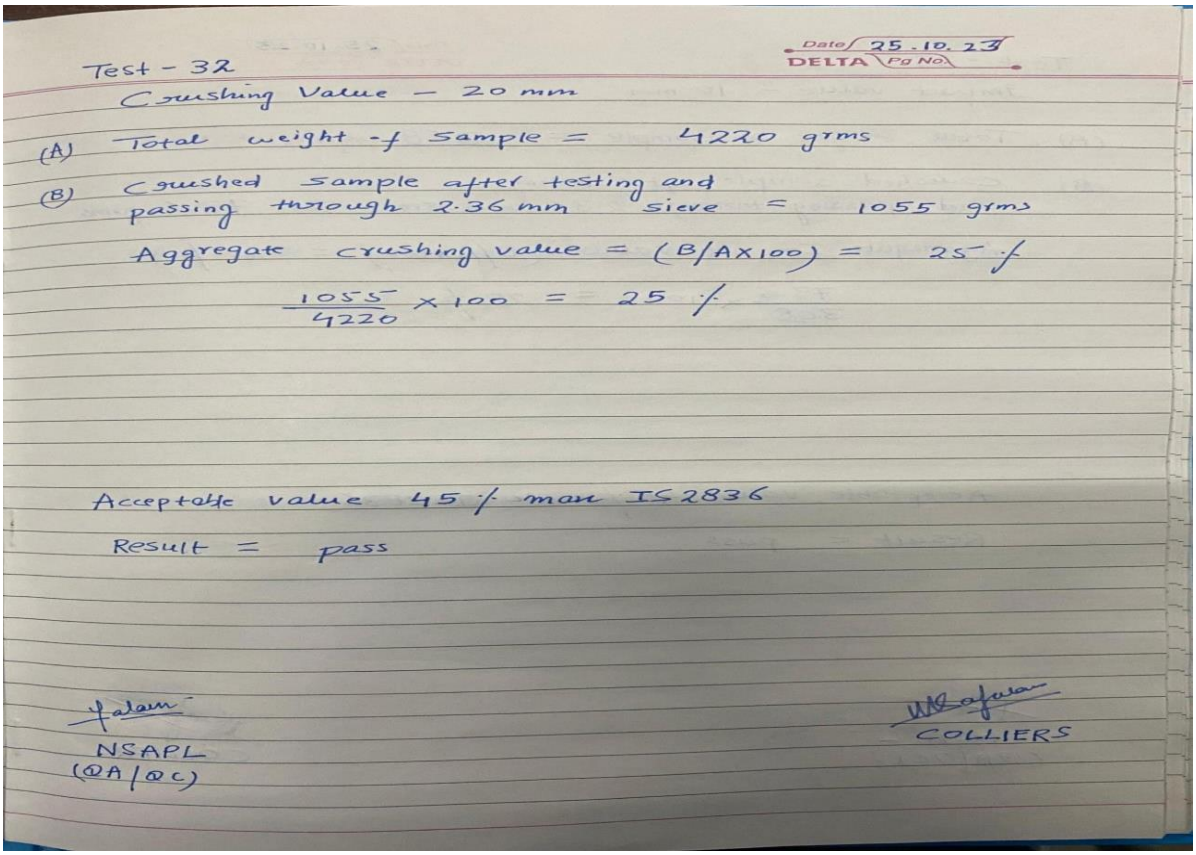
Acceptable value 45% max IS 2836

Result = pass

NSAPL
(QA/QC)

COLLIERS

iJETRM
International Journal of Engineering Technology Research & Management
Published By:
https://www.ijetrm.com/


Test - 32
Date 25.10.23
DELTA Pg No.
Crushing Value - 20 mm
(A) Total weight of sample = 4220 grms
(B) Crushed sample after testing and passing through 2.36 mm sieve = 1055 grms
Aggregate crushing value = (B/A x 100) = 25 %
1055/4220 x 100 = 25 %
Acceptable value 45 % max IS 2836
Result = pass
NSAPL
(QA/QC)
COLLIERS

CONCLUSION

As a pilot study, fly ash aggregates has been made by pelletizing and cold bonding technique and the property of the obtained aggregates has been compared with natural gravel and results are found to be comparable.

REFERENCES

1. AlKhaiat, H., Haque, M. N., 1998, Effect of Initial curing on early strength and physical Properties of a lightweight concrete, Cement and Concrete Research, 28, pp 859–866.
2. Baykal, G., Doven, A.G., 2000, Utilization of fly ash by palletization process, theory, application areas and research results, Resource Conservation Recycling.
3. Geetha, S., Ramamurthy, K., 2011, Properties of sintered low calcium bottom ash aggregate with clay binders, Construction.
4. Manikandan, R., Ramamurthy, K., 2007, Influence of fineness of fly ash on the aggregate palletization process, Cement & Concrete Composites,