Lowland Technology International 2021; Volume 23 (3): 41-46
International Association of Lowland Technology (IALT): ISSN 1344-9656

Research Paper

Analysis of strength of cement fiber pipes with the utilization of economic mixed fiber as a mixed material

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ARTICLE INFORMATION

Article history:

Received: 17 June, 2021
Received in revised form: 21 August, 2021
Accepted: 03 September, 2021
Publish on: 06 December, 2021

Keywords:

Cement
Pipe
Fiber
Palm Fiber
Material

ABSTRACT

Water is one of the main factors in human life. This fact brings us to the problem that often occurs, namely the use of low-quality water for the purpose of washing, bathing, cooking and drinking. The characteristics of such water in general, among others, the water is cloudy or dull, sometimes somewhat smelling rust and rancid, if exposed to sunlight for a long time, changes color to brownish black. In addition to feeling less comfortable, if this water is used to wash it will give a yellow stain on the clothes. A healthy way is to use a pipe or closed channel. Commonly used water lines are using bamboo pipes, which are rather expensive are PVC pipes and iron pipes. Especially if you use a large pipe size and for long distances, the required costs will be expensive. For rural areas, of course the problem of the availability of costs also needs attention. By paying attention to the things mentioned above, we will develop a method of making pipes that are simple, using materials that are easily available, and more importantly can be made alone, namely pipes with a mixture of palm fiber and cement. With the use of cement fibers, it is intended to apply the operational process to water with good quality.

1. Introduction

The contstruction of cement fibers is a building material whose quality can be planned through mixed planning analysis. The type of cement selection depends largely on the type of construction and surrounding environment. Based on the background that has been mentioned above, it can be drawn the problem formulation that is how the performance level of the pipe materials used as a mix of cement-type pipe makers. The strength evaluation on the cement pipe is done at age 7 days by looking at the tip of the pipe examination of the result of the manufacture of cement fiber pipes with the test of incoming light from the side of the pipe which means leakage. Can change the goods that have no economic value into have goods that have economic value and benefit. Learn about the benefits of ijuk as a mixing material of pipes that are expected to have more power than the PVC pipe. Can produce alternative materials of economic value. Choose materials that have eco-friendly values.

The cement fiber cement is defined as a mixture of Portland or fine cement with fine aggregate, fiber and water, with or without additional mixing material.

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2. Literature Review

According to (SK.SNI T-15-1990-03: 2) Portland cement is classified in 5types. The aggregate is a glandular material such as sand, crude, broken stone and iron furnace, which is used together with a binder media to form a mixture.

Fibers are black and mud fibers, found in the rim and palm leaves, ijuk is bumpy and is not easily brittle, very resistant to acid puddles including puddles containing salt water. According to the General Terms of Building Materials in Indonesia (PUBI - 1982), (1982: 14-15) The water used must meet certain conditions of cement water factor comparing the amount of water found in concrete mixes with cement. The mortar is material with added water, becoming a mass of posolan with added water , so it can be used for adhesives on a pair of red bricks or the like. This treatment is done after the pipe reaches the final setting, meaning the pipe has hardened.

Water is one of the main factors in human life. This fact brings us to the problem that often occurs, namely the use of low-quality water for the purpose of washing, bathing, cooking and drinking. The characteristics of such water in general, among others, the water is cloudy o dul, somethimes smelling rust and rancid, if exposed to sunlight for a long time, changes color to brownish black. In addition to feeling less comfortable, if this water is used to wash it will give a yellow stain on the clothes. Especially if you use a larg pipe size and long distances, the required costs will be expensive. For rural areas, ofcourse the roblem of the availability of costs also needs atention. By paying attention to the things mentioned above, we will develop a method of making pipes that are simple, using materials that are easily available, and more importantly can be made alone, namely pipes with a mixture of palm fiber and cemet. With the use od cement fiber, it is intended to apply the operational process to water with good quality.

3. Research Methodology

The research was carried out in the concrete construction laboratory of the University of 17 Agustus 1945 Banyuwangi. Starting the preparation, manufacture and testing of pipe ylinders is carried out by the same person, the time of this study includes preparation, material testing, miced planning, making specimens sanples, curing treatment, testing the compressive strength of the spicmens on day 7, 14 and 28 days, data analysis calculations by looking at the problems and research objetives that exist, then this research was conducted using the experimental method. In conducting research for the proorion of the mixture of test specimens by testing number of pipe cylinder test specimens. The test obect in this study is a cylinder measurng 2m – 5 m long with a diameter of 3 or 4 inches, each 3 piees according to their needs. For research purposes as a whole the tools and materials need to be selected for good quality materials from each material to be used, while the toos used in this study are portland Cement, Aggregate, clean water to obtain the required data, materials that will checkedwas fine aggregate (sand), while portland cement and water were not examined with consideration of quality. This examination is intended to determine the distribution of items (gradation) fine aggregate using a filter.

The ement fiber pipe is defined as a mixture between portland cement or any type of fine aggregate, palm fiber and water with or without additional mixed inggredients.

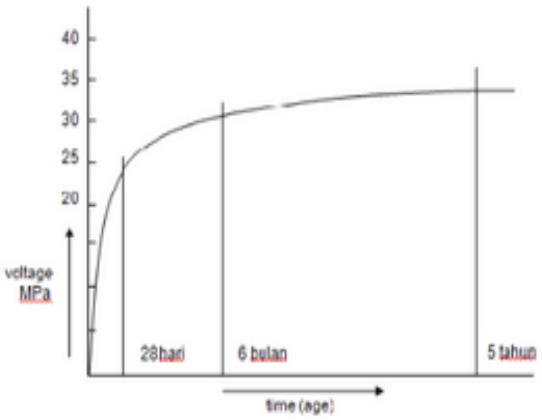


Fig. 1. Strength Concrete Diagram Vx Age of Concrete

By looking at the problems and research objectives that exist, the research is conducted usng the experimental method. In conducting research for the proportion of the mixture of making test specimens by testing a number of pipe cylinder test specimens. The test specimens in this study were cylinders measuring 2 m – 5 m in diameter 3 or 4 inches each with 3 pieces according to their needs.

For research purposes as a whole tools and materials need to be selected for good quality materials from each ingredient to be used, while the tools used in this study are portland cement, aggregate, clean water. To obtain the required data, the materials to be examined are fine aggregates (sand), while portland cement and water are not examined with consideration of quality. This examination is intended to determine the distribution of grains (gradation) of fine aggregates using a sieve.

To know the compressed strength of the cylinder pipe, the compressive strenght calculation is calculated

based on the formula. Filter graphcs has been shown in Figure 2.

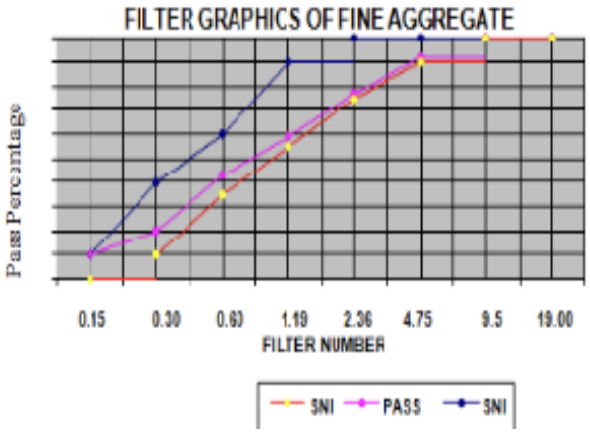


Fig. 2. Filter Graphics Of Fine Aggregate

The standards used in this study are SNI, ASTM, and Modul of Laboratory from Universitas 17 Agustus 1945, Banyuwangi, Indonesia.

4. Result and Discussion

4.1 Mix Plan

Mix design were prepared by trial mix and arrange the composition of materials used. As shown in the Table 1.

Table 1. The composition of materials used in the mix design for trial study.

No	Size (Cm) D1 (cm)	Size (Cm) D2 (cm)	Areas (cm^2)	Max. loads (Tf)	Compressive strength $\tau ab = Tf \times 22.4$ (kg/cm^2)	Average compressive strength	$(\tau b - \tau bm)^2$ (kg/cm^2)
1	8,6	6.4	25.9	4000	184.239		0.069
2	8,6	6.4	25.9	3940	182.046		3.725
3	8,6	6.4	25.9	4025	186.213		5.005
4	8.6	6.4	25.9	4050	187.529		12.625
5	8,6	6.4	25.9	3885	179.853		17.002
					919.882	183.9764	38.427

number of specimens n = 5

Table 2. The average value of the pipe strength

Pipe Strength (kg/cm^2)	Average Value of W/C
441	0,44
331	0,53
263	0,62
193	0,73
153	0,80

In this research, pipe mixing (Design mix) using ASTM method. Determine the amount of cement per m3 of pipe mixutures.

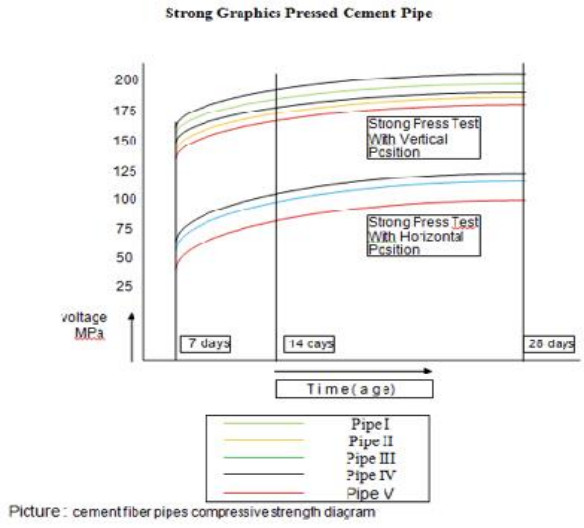
$$W/C = 193 / 0{,}712$$
$$= 271{,}07 \text{ kg}$$

The weight of pipe used is 271,07 Kg.

4.2 Compressive strength result

The ingredients are fine aggregate Ømax items is 4.75 mm and cement Bosowa. Mixing planning according to testing, cement 283 kg Water 148,89 kg, Sand 170 kg, Surface area of the specimen :

Horizontally : 2pl = 36 cm2
Vertically : $(\pi 1 / 2d1^2) - ((\pi 1 / 2d2^2)$
= 25 . 9 cm2



Picture : cement fiber pipes compressive strength diagram

Fig. 3. The Strong Graphics Pressed Cement Pipe

Table 3. The result of the strength of pipe with horizontal position.

No	size (Cm) p	size (Cm) l	areas (cm^2)	Max load (Tf)	Compressive strength $\tau ab = Tf / L$ (kg/cm^2)	Average compressive strength	$(\tau b - \tau bm)^2$ (kg/cm^2)
1	15	1.2	36	3800	105.555		0.308
2	15	1.2	36	3740	103.888		1.234
3	15	1.2	36	3825	106.250		1.562
4	15	1.2	36	3850	106.944		3.780
5	15	1.2	36	3685	102.361		6.963
					525.000	105	13.850

number of specimens n = 5

5. Conclusions

The pipe pressure strength is influenced by the amount of replacement partial aggregate and mix compoition, and the quality of the fiber we will use. Look for economical and efficient manufacturing prices with easy materials. This research method should be done further by paying attention to the materials test and equipment, and most importantly is the inspection of compressive engine that meets the accurate standard. In the manufacture of cement fiber pipe must know the cost of manufacture and compare the price of the material in the market to get the economical value. In order to know the maximum final result in making the pipe, the material ratio between pipe and shall pipe be made.

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