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DEVELOPMENT OF RUBBERCRETE INTERLOCKING BRICKS

INTRODUCTION

This chapter will highlight the specimen preparation and experimental works executed. It consists of the physical, mechanical and chemical properties of the ingredients used in the production of rubbercrete interlocking brick. The trail mixture of the rubbercrete and the rubbercrete interlocking bricks production have been outlined in this chapter.

MATERIAL PROPERTIES

In producing rubbercrete interlocking brick, fine aggregates, cement, crumb rubber, fly ash and water have been used. Physical and mechanical properties of the materials are important, especially at the trial mix design stage whereby the amount of fine aggregates and cement are partially replaced with crumb rubber and fly ash, respectively.

Ordinary Portland Cement

Ordinary Portland Cement (OPC) is the main material used in the concrete industry. Type 1 ordinary Portland cement that is commercially available was used. The chemical composition of the cement is given in Table 3.1. According to ASTM C150 [37], OPC can be classified as Type 1 due to the chemical composition with

a specific gravity of 3.15. The loss of ignition (LOI) of cement is 2.2% less than the maximum limit stated in ASTM C150.

Table 3.1 Chemical composition of ordinary Portland cement

Oxide	% by mass	Requirement as per ASTM C150
Silicon dioxide (SiO_2)	20.76	20 % minimum
Aluminium oxide (Al_2O_3)	5.54	6 % maximum
Ferric oxide (Fe_2O_3)	3.35	6 % maximum
Calcium oxide (CaO)	61.4	-
Magnesium oxide (MgO)	2.48	6 % maximum
Sodium oxide (Na_2O)	0.19	-
Potassium oxide (K_2O)	0.78	-
Loss of iginition (LOI)	2.2	3 % maximum
Specific gravity	3.15	

Fly Ash

Fly ash is the waste material obtained from the coal fire power plant. Fly ash is also known as cement replacement materials (CRM), has been used to partially replacing the OPC by volume. The physical and chemical compositions of fly ash is shown in Table 3.2. Based on the data presented in Table 3.2, the total amount of silicon dioxide (SiO_2), aluminium oxide (Al_2O_3) and ferric oxide (Fe_2O_3) is 82.12%, and CaO is 9.79%, the fly ash has been classified as class F fly ash according to the requirements of ASTM C618. This class F fly ash contains pozzolanic properties with a specific gravity of 2.38. The Loss of ignition of fly ash is 1.25%, less than the maximum value stipulated in ASTM C618.

Fine Aggregate

Washed river sand with a maximum size of 2.36 mm was used as natural fine aggregates in the production of the rubbercrete