MSc Degree in Environmental Science

STUDY ON USE OF ENVIRONMENTAL FRIENDLY ALTERNATIVE FIBER MATERIALS FOR ASBESTOS ROOFING SHEETS IN SRI LANKA

A dissertation submitted

by

DUNUKE ADIKARAMLAGE CRISHANTHIKA DILMINI

PRYANGA PEIRIS

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ABSTRACT

World Health Organization's (WHO), International Programme on Chemical safety, 2011, reveals that all forms of asbestos pose a health hazard. According to WHO, 107,000 people die each year from asbestos related lung cancer, mesothelioma and asbestosis mainly due to occupational exposure. WHO, International Programme on Chemical safety, 2011, stands by the policy of banning all types of asbestos in the world. As such more than 50 countries have banned the use of asbestos fiber.

Sri Lanka banned blue asbestos in 1997 but allowed white asbestos to be used mainly for the production of roofing sheets. Recently, the Sri Lankan government had taken a decision to gradually reduce the import of asbestos fiber from year 2018 and to ban the use of asbestos totally in 2020.

Since it has been revealed the use of asbestos roofing and its production process result many health impacts on the people who involved in the production of asbestos, and also on the users, it is highly justifiable that Sri Lanka should ban the use of this product and should go for an alternative product to safeguard the future of the country.

The objective of this study is to find out an environmental friendly alternative fiber material available in Sri Lanka for manufacturing of non-asbestos roofing sheets. During the study, asbestos fiber was replaced by alternative cellulose fiber materials found in Sri Lanka such as rice husk, paper pulp, coir fiber and coconut charcoal.

Breaking load, apparent density, water absorption, water permeability, visual inspection & weights of the sheets were tested for all fiber types & compare with both asbestos fiber and non –asbestos fiber standards to check the feasibility of use of alternative asbestos fiber.

Both parameters of water permeability and visual inspection were complied with ISO 10904: 2011 as well as IS 14871: 2000 for all fiber types. Test results of water absorption of all fiber types showed less than 25% of the dry mass. As per SLS 9: Part 2: 2001standrad, water absorption should not exceed (maximum) 28 % of the dry mass. The weight of non-asbestos sheets were in the limit between 14 kg to 18 kg for the sheet size (1.0×0.9) m × 8.5 mm which is reasonably an acceptable weight for a roofing sheet. Density of every sample shall not less than 1200 kg/m^3 when tested in accordance with SLS 9: Part 2: 2001. Test results of density of all fiber types are well within the limit of SLS 9: Part 2: 2001. Test results of breaking load of rice husk sample was 694 N/m and breaking load value of paper pulp sample was 583 N/m. As per ISO 10904: 2011 standard, declared breaking load value is minimum 600 N/m.

Based on the results obtained and comparing with standards, rice husk could be considered as the best alternative fiber material in the production of roofing sheets. Paper pulp sample also marginally complied with both ISO 10904: 2011 standard & IS 1487: 2000.

Key words: Asbestos fiber, Non-asbestos fiber, Rice husk, Coconut charcoal, Coir fiber and Paper pulp