CHAPTER V

CONCLUSIONS

5.1 Conclusions

Physical and mechanical properties of the epoxy resin-based coating and flooring were improved by using silane coupling agent (AEAPS). The epoxy coating films with various thickness of 25, 50, 75 and 100 μm were tested for its heat resistance. The elevated temperature of 300 °C for 20 minutes, in conjunction with the epoxy resin cured with AEAPS gave the coating having the good heat resistance for all film thickness. The siloxane network formed on the steel surface can protect the film from heat. The inevitable heat resistance of the film thickness of 100 μm was observed. The FTIR was observed for the siloxane crosslinking reaction (Si-O-Si). This indicated epoxy/AEAPS property of the coated film as a result of network formation. A colorimeter was used to measure color difference (ΔE*) of the film before and after heating. Color difference (ΔE*) decreased with AEAPS 7 wt%. The ΔE* results were correlated with the extent of heat resistance in that the high ΔE* value provided the negative impact on the film, the higher the ΔE* valves, the poorer the heat resistance. The TGA thermogram showed that the ash content increased with increase in AEAPS concentration, especially as a function of a curing agent. Corrosion on steel substrate protection by addition of AEAPS to epoxy resin and the thicker films delayed the attack of water and oxygen at the interface. From the corrosion resistance testing, epoxy resin cured with AEAPS 7 wt% having film thickness of 100 μm showed the highest resistance and followed by 5, 3, 1 wt% and control (no AEAPS), respectively. The coating films were tested for adhesion on steel substrate. At the cure

time of 24 hours at room temperature, the AEAPS addition to the epoxy at the concentrations of 1 and 3 wt% showed the best adhesion on steel substrates. In addition, the coatings cured at 105 ^{o}C have very good adhesion for all formulations.

Mechanical properties of the epoxy flooring were tested. The hardness was increased with increase in AEAPS and curing time. The epoxy flooring with an optimum AEAPS concentration of 3 wt% gave the good compressive strength and chemical resistance. However, silane (AEAPS) curing agent was used to replace the substituted the amine curing agent, and it induced better mechanical properties and chemical resistance.

5.2 Suggestion for further work

The further development of epoxy coating is focused on the demand for improvements in durability and appearance. The use of mixed aromatic silane with aliphatic silane improves the high water resistance and thermal stability, since aromatic silanes, in general, have much better heat stability and oxidation resistance than those of aliphatic silanes. The pot life of the epoxy resin should also be carried out.