ABSTRACT

This research is aimed to incorporate rockwool and glasswool fibres into an intumescent coating. Briefly, intumescent coating is a fire retardant coating that protects structural materials against fire. This research studies the effect of rockwool and glasswool on thermal performance of intumescent coating. The composition of the fibres is varied to get the best sample. The results show that the addition of rockwool and glasswool will increase the thermal performance, which is the intumescent coating resistance to fire. The samples have gone through Scanning Electron Microscope (SEM) for analysis. From there, the characteristics of the samples' char are achieved. The thermal performance is determined by direct fire test. The data of time versus temperature is attained and that could conclude the effect of rockwool and rockwool on thermal performance of intumescent coating.

ACKNOWLEDGEMENT

First and foremost, all praise to God for giving me the opportunity and strength to complete this Final Year Project. The warmest appreciation to my supervisor, Ap. Dr. Faiz Ahmad for his guidance, suggestions, invaluable help and continuous support. As an advisor, he was very keen in facilitating the author to complete this project. I am very grateful for his full attention in assisting in the completion of this Final Year Project.

Endless appreciations to fellow Graduate Assistant (GA) especially to Mr. Samiullah, Miss Jesbains and Mrs. Laily for their continuous help, advice and guidance throughout the research work.

Also thank you to all technicians that connect directly or indirectly for their continuous help and support for providing their technical assistance and sharing their specialities during conducting the laboratory work and provide a very good working environment.

Last but not least, I would like to thank my family and my friends for their continuous support, encouragement and effort in assisting the laboratory work. None of this would have been possible without them.

TABLE OF CONTENTS

CERTIFICATION	•		•	•	•	•	•	•	1
ABSTRACT.	•	•	•	•	•	•	•	•	iii
ACKNOWLEDGE	MENT.		•	•	•	•	•	•	iv
LIST OF FIGURES	S		•	•	•	•	•	•	vii
LIST OF TABLES	•	•	•	•	•	•	•	•	viii
CHAPTER 1: INT	RODUC	ΓΙΟN .		•	•	•	•	•	1
1.1 Ba	ackground	l of Stu	dies.		•	•	•	•	1
	1.1.1 Gl	asswoo	ol.				•	•	2
	1.1.2 Ro	ockwoo	ol.				•	•	2
1.2 Pr	oblem Sta	atemen	t .	•	•	•	•	•	3
1.3 Ol	bjective a	nd Sco	pe of St	udy.		•	•	•	3
CHAPTER 2: LITERATURE REVIEW						•	•	•	4
2.1 Literature Review			•		•	•		•	4
2.1.1 Composition Of Intumescent Coating.						•	4		
	2.1.2 Gl	asswoo	ol.		•	•		•	6
	2.1.3 Ro	ockwoo	ol.		•	•		•	6
	2.1.4 Li Coating		e on Th	ermal F	Resistan	ce Test	of Intui	mescent	7
	2.1.5 Th	nermal	Perforn	nance T	est Star	ndard.	•	•	9
CHAPTER 3: METHODOLOGY							•	11	
3.1 Pr							11		
3.2 Specific Activities.									11
3.3 Sa	imples Pro	eparatio	ons .		•	•			12

3.4 Samples Analysis	•	•	•	•	13
3.4.1 Scanning Electron Micro	roscope	· .			13
3.4.2 Thermal Test .					14
CHAPTER 4: RESULTS AND DISCUSSION.	•	•		•	15
4.1 Results & Discussion	•	•			15
4.1.1 Normal Formulation (Without Reinform	cement	<u>.</u>).	•	•	15
4.1.2 Scanning Electron Microscope (SEM)	For No	ormal Fo	ormulati	on.	22
4.1.3 Results & Discussion Of Fibre Reinfor	rced Int	umesce	nt Coati	ings.	23
4.1.4 Scanning Electric Microscope (Sem) I	For Fibr	e Reinfe	orced In	tumesc	ent
Coatings					25
4.1.4.1 Analysis And Discussion For	r Sem.			•	28
4.1.5 Direct Fire Test (Thermal Test).	•				29
4.1.5.1 Analysis And Discussion.	•				32
CHAPTER 5: CONCLUSION AND RECOMM	ENDA	TIONS	•	•	33
5.1 Conclusion.		•			33
5.2 Recommendations		•			34
REFERENCES		•	•	•	35
APPENDICES					36

LIST OF FIGURES

- Figure 1 Swollen intumescent coating
- Figure 2 Result on Epiradiator Test
- Figure 3 Slug Calorimeter
- Figure 4 Cone Calorimeter
- Figure 5 Intumescent coatings sample preparations
- Figure 6 Direct burning setup for measuring the temperature of back steel
- Figure 7 Before fire burning test samples
- Figure 8-20 Normal Formulation Samples
- Figure 21 SEM Outer image for N8
- Figure 22 SEM inner image for N8
- Figure 23-28 Fibre Reinforced Samples
- Figure 29 SEM Outer image for sample R0.5
- Figure 30 SEM inner image for sample R0.5
- Figure 31 SEM Outer image for sample G0.5
- Figure 32 SEM inner image for sample G0.5
- Figure 33 SEM Outer image for sample G0.24
- Figure 34 SEM inner image for sample G0.24
- Figure 35 Glasswool used in study
- Figure 36 Rockwool used in study

LIST OF TABLES

- Table 1 Thermal Resistance & Density of Glasswool and Rockwool
- Table 2 Basic Intumescent Coating Formulation
- Table 3 Height before burnt
- Table 4 Height after burnt
- Table 5 After burnt samples
- Table 6 4 best formulations
- Table 7 Intumescent coating with reinforced glasswool
- Table 8 Intumescent coating with reinforced rockwool