TEST REPORT

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SETSCO

Setsco Services Pte Ltd
18 Teban Gardens Crescent
Singapore 608925
Tel : (65) 6566 7777
Fax: (65) 6566 7718
www.setsco.com
Business Reg. No. 196900269D

Your Ref: Application Dated 26/04/2016 **Our Ref: CT-35225/SS/2** **Date: 29/04/2016**

Subject : Testing of GFRC materials, submitted by STA Construction Pte Ltd

Tested For : **STA ART & Moulding Pte.Ltd**
21 Bukit Batok Crescent
#02-76 WCEGA Tower
Singapore 658065
Attn: Ms Sylvia Wong

Method of Test : Slip Resistance Test - SS 485: 2011 (Annex A & B)

Specification : SS 485: 2011 - Specification for slip resistance classification of pedestrian surface materials

Description of Sample : The details as furnished by client are as follows:

01 (One) pcs of GFRC specimen size 1 m x 1m were coated with Berger –FPU570092805 Luxathene 5075 sealer on the decorative side were received.

Results : Refer to results on page 3

Manufacturing for GFRC Panel.

1. Cement, sand, water, plasticiser, glass fibre and forton polymer VF774 mixed with mixer become premixed GFRC.

2. The content for cement, sand, water and plasticiser is 97%; content of glass fibre is 3%; ratio of Forton Polymer is 5% of cement weight.

3. The premixed GFRC spray into mould and vibrated to achieve condsolidation.

4. Take out from mould and spray coating with 2 layers.

5. The facing layer is the thin decorative layer and the back up layer is thicker and contains the glass fibre.

6. The thin decorative layer coating with sealer (Beger – FPU570092805 Luxathane 5075 Clear (MATT)), approximately is 3mm. For back up layer is premixed material contains the glass fibre.

Results:

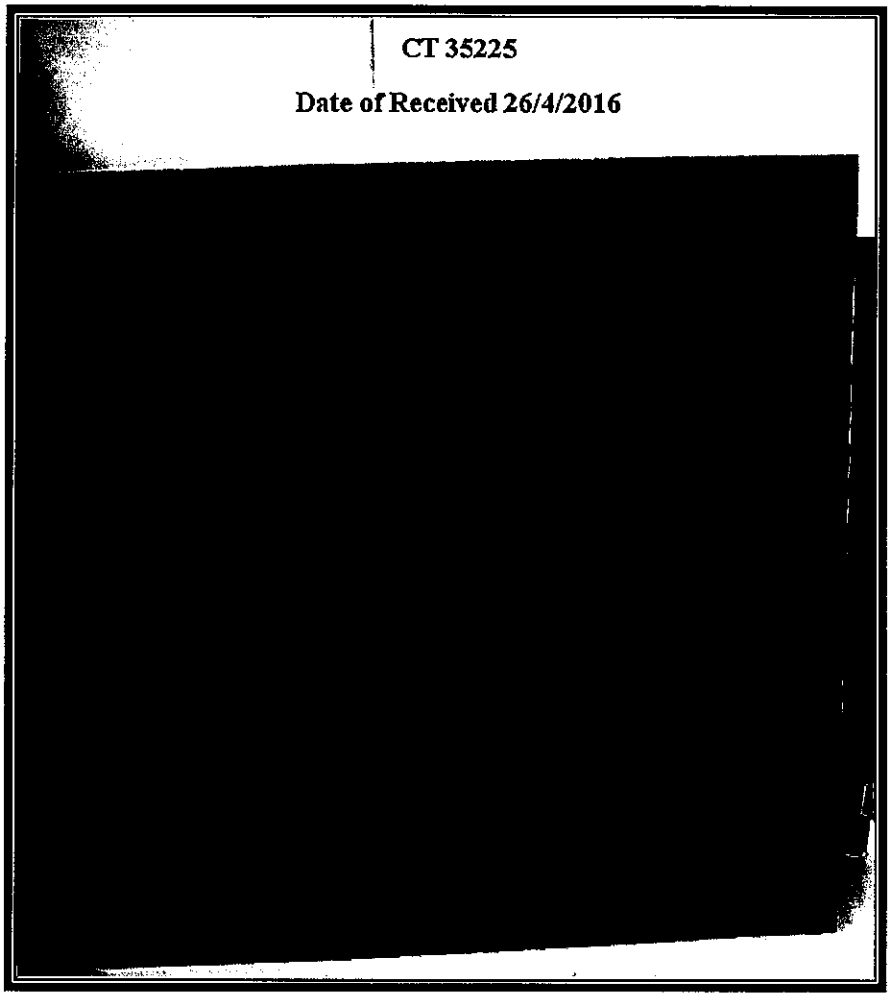
Table 1 Slip Resistance Test

Sample Reference		**1000 x 100 mm, GFRC materials**					
Date of Test		26/04/2016					
Test Temperature		24°C / 50% RH					
Slider Material Used		Four S Rubber (IRHD Hardness 96)					
Direction of Test (along or across)		NA					
Test Apparatus		**Floor Friction Tester**					
Moisture Condition of Surface		Dry					
Test No.		**1**			**2**		
Coefficient of Friction, μ	Average of 800mm run	0.68			0.73		
	Mean	0.70					
Classification achieved		**F** (Moderate to very low contribution to slipperiness)					
Test Apparatus		**Pendulum Friction Tester**					
Moisture Condition of Surface		Wet					
Specimen Reference		**1**	**2**	**3**	**4**	**5**	
British Pendulum Number, BPN	Parallel to grain	58	59	60	62	59	
	Specimen average	60					
	Perpendicular to grain	72	70	71	72	71	
	Specimen average	71					
Classification achieved		**V** (Very Low contribution to slipperiness)					

Note: Refer to Appendix A for classification

Ashraf iskandar mar Dikarno
Testing Officer

Salim Suwignjo
Principal Engineer (CMTD)
Construction Technology Division



Photograph showing 1000 mm x 1000 mm , GFRC materials as received

APPENDIX A
Classification Extracted From SS 485: 2011

Table 1: Wet pendulum test classification

Classification	Pendulum mean BPN		Notional† contribution of the floor surface to the risk of slipping when wet
	Four S Rubber	TRL Rubber	
V	> 54	> 44	Very Low
W	45 to 54	40 to 44	Low
X	35 to 44	-	Moderate
Y	25 to 34	-	High
Z	< 25	-	Very High

† The term 'notional' has been used to highlight the need to consider all potential contributing factors to a slip incident

Table 2: Dry floor friction test classification

Classification	Floor friction tester mean value	Notional† contribution of the floor surface to the risk of slipping when dry
F	≥ 0.4	Moderate to very low
G	< 0.4	High to very high

† The term 'notional' has been used to highlight the need to consider all potential contributing factors to a slip incident

Selection of pedestrian surface materials

It should be noted that compliance with the recommendations of this appendix will not necessarily alleviate all hazards. However, it will reduce certain pedestrian risks.

Other design considerations include the amount and type of expected traffic (vehicles, trolleys, people hurrying, elderly, disabled people with or without walking aids, and children); the product characteristics (wear resistance and cleanability) and the consequences of exposure to the types of contamination minimization); management policy and maintenance practices (types of cleaning equipment, frequency and effectiveness of cleaning); compliance with occupational, health and safety requirements; special provisions for slip hazards (guards and handrails); and alternative information sources (use of contrasting colours and warning signs).

Table 3: Pedestrian flooring selection guide – minimum pendulum or ramp recommendation for specific locations

Location	Pendulum	Ramp
External colonnade, walkways and pedestrian crossings	W	R10
External ramps	V	R11
Entry foyers hotel, office, public buildings - wet	X	R10
Entry foyers hotel, office, public buildings - dry	Z	R9
Shopping centre excluding food court	Z	R9
Internal ramps, slopes (greater than 2 degrees) - dry	X	R10
Lift lobbies other than entry foyers	Z	R9
Other shops with external entrances - entry area	X	R10
Food outlets including fast food outlets, buffet food servery areas	X	R10
Hospitals and aged care facilities - dry areas	Z	R9
Hospitals and aged care facilities - ensuites	X	A or R10
Shop and supermarket aisles except fresh food areas	Z	R9
Shop and supermarket fresh food areas	X	R10
Communal changing rooms	X	A
Swimming pool surrounds and communal shower rooms	W	B
Swimming pool ramps and stairs leading into water	V	C
Toilet facilities in offices, hotels, shopping centres	X	R10
Undercover concourse areas of sports stadium	X	R10
Accessible internal stair nosings (dry) - handrails present	X	R10
Accessible internal stair nosings (wet) - handrails present	W	B or R11
External stair nosings	W	R11

Note 1 - Appropriate measures need to be taken to exclude casual water from dry areas.
Note 2 - All floors with a wet pendulum classification of Z should have a dry floor friction of F unless normal usage dictates that the floor should have a low dry coefficient of friction, e.g dance floors