

TEST REPORT

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Subject : Determination of solid content and slant shear bond strength on mortar substrates coated with Warrior W1 Bonding Agent as requested by Warrior Pte Ltd on 04/09/2019.

Tested for : **Warrior Pte Ltd**
Block 17
Marsiling Industrial Estate Road 1
#01-11
Singapore 739279
Attn: Ms Latifah

Method of test : 1. Solid Content: ISO 124: 2014
2. Slant Shear Bond Strength: ASTM C 1042: 1999

Specification : 1. Slant Shear Bond Strength to ASTM C1059: 1991
2. HDB's Specification for Bonding Agent for Concrete Surface (One-part and Two-part system)

Description of Sample : One container of Warrior W1 Bonding Agent marked HDB/BQG/ML date 26/08/2019 approximately 5 liters was received.
(See photograph 1 attached).



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LA-1993-0051-C LA-1998-0144-D
LA-1993-0067-G LA-2000-0181-F
LA-1994-0068-A LA-2012-0519-E
LA-1987-0001-B LA-1987-0001-B-1

**Application :
Procedure for
Slant Shear Bond
Strength for Internal Use**

1. The Warrior W1 Bonding Agent was applied onto the elliptical surface of a mortar half-cylinder at the coverage of 5 m²/litre.
2. Once the coat was tacky, the half-cylinder was then built-up to a full cylinder with fresh mortar.
3. The above procedure was repeated for another two test specimens.

**Application :
Procedure for
Slant Shear Bond
Strength for External Use**

1. The Warrior W1 Bonding Agent elliptical surface Bonding Agent mixed with cement in the ratio of 1:2 was applied onto the elliptical surface of a mortar half-cylinder at the coverage of 5 m²/litre.
2. Once the coat was tacky, the half-cylinder was then built-up to a full cylinder with fresh mortar.
3. The above procedure was repeated for another two test specimens.

**Curing of
Test Specimen**

1. The test specimens for slant shear bond strength were left to cure in the mould for 7 days before demoulding and further cured in air for another 7 days before test for internal use.
2. The test specimens for slant shear bond strength were left to cure in the mould for 7 days before demoulding and further cured in lime water for another 7 days before test for external use.

Test Results

: The summary of the tested results are given in Table 1 and the results of solid content and slant shear bond strength test for internal and external use are given in Tables 2 to 4 respectively.

B. [Signature]

[Signature]

Results:
Table 1: Summary of Tested Results

Tests	HDB's Passing Criteria	Warrior W1 Bonding Agent
Solid Content (%)	-	30.7
Slant Shear Bond Strength at 14 days (N/mm ²)	Type I ≥ 2.8 N/mm ²	2.9
	Type II ≥ 8.7 N/mm ²	8.8

Table 2: Solid Content

Sample Reference	Warrior W1 Bonding Agent	
	1	2
Specimen Reference	1	2
Date of Test	11/09/2019	
Heating Temperature (C)	105	
Solid Content (%)	31.4	30.0
Average Solid Content (%)	30.7	

Table 3: Slant Shear Bond Strength for Internal Use

Sample Reference	Warrior W1 Bonding Agent		
	1	2	3
Specimen Reference	1	2	3
Condition of Mortar Half-Cylinder at Time of Application	Dry		
Coverage as Provided by Client (m ² /L)	5		
Date of Build-up and Application	11/09/2019		
Date of Bond Strength Test	25/09/2019		
Age at Test	14		
Bond Area of Elliptical Surface of Half-Cylinder (mm ²)	9116		
Bond Strength (N/mm ²)	2.9	2.8	2.9
Average Bond Strength (N/mm ²)	2.9		
Mode of Failure	Bond*		

* See photograph 2 for mode of failure.

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Results:

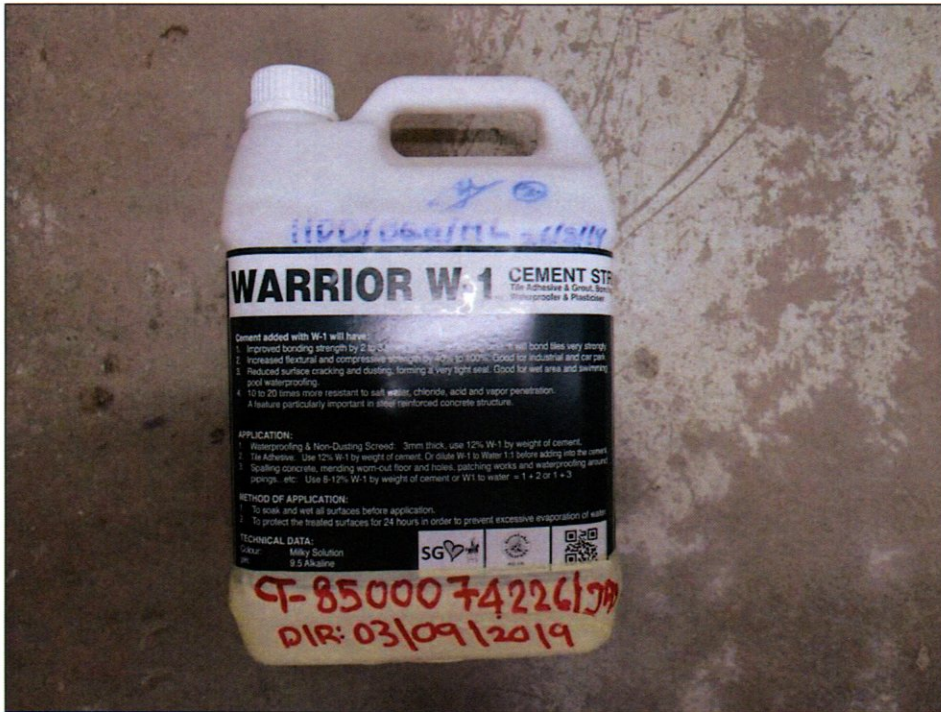
Table 4: Slant Shear Bond Strength for External Use

Sample Reference	Warrior W1 Bonding Agent		
	1	2	3
Specimen Reference	1	2	3
Condition of Mortar Half-Cylinder at Time of Application	Damp		
Coverage as Provided by Client (m ² /L)	5		
Date of Build-up and Application	11/09/2019		
Date of Bond Strength Test	25/09/2019		
Age at Test	14		
Bond Area of Elliptical Surface of Half-Cylinder (mm ²)	9116		
Bond Strength (N/mm ²)	8.8	8.8	8.9
Average Bond Strength (N/mm ²)	8.8		
Mode of Failure	Bond*		

* See photograph 3 for mode of failure.


 Suresh Mehnan
 Testing Officer


 Jasbeer Singh
 Engineer (CMTD)
 Construction Technology Division



Photograph 1: Shows one container of Warrior W1 Bonding Agent as received.



Photograph 2: Shows bond failure of Warrior W1 Bonding Agent between the two half-cylinders at the age of 14 days for Internal use.

B. [Signature]

[Handwritten mark]



Photograph 3: Shows bond failure of Warrior W1 Bonding Agent between the two half-cylinders at the age of 14 days for External use.

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