

Report

Testing of bond strength between Rapido Tynnpuss (thin finishing mortar) and different substrates

This report is a translated version of the original report 102006317 Rapport RVL Products Måling av heftfasthet

The name of Rapido Tynnpuss is today RVL

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Conclusion

SINTEF Building and infrastructure has, on behalf of RVL Products AS, performed bond strength tests between Rapido Tynnpuss (thin finishing mortar) and substrates of concrete, bricks, Steni Terra foundation wall panels, Ruukki Laser structural steel sheets and Jackon Super EPS 60-80.

The results show that fracture occurred either in the substrates or in Rapido Tynnpuss. SINTEF assess, of this reason, that the bond strength properties for Rapido Tynnpuss is good.

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Bond strength**CLASSIFICATION**
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1. Introduction

SINTEF Building and infrastructure (SINTEF) has, on behalf of RVL Products AS performed bond strength tests between Rapido Tynnpuss (thin finishing mortar) and substrates of concrete, brick, Steni Terra foundation wall panel, Ruukki structural steel sheet and Jackon Super EPS 60-80.

2. Test specimens

The specimens were made by the client, sent to SINTEF and arrived at our laboratory at 20th of May 2014 (see picture 1 in Appendix 1). The specimens were given arrival number 111-14. Based on the submitted samples, SINTEF selected the required number of samples to be used to determine the bond strength, see picture 2 in Appendix 1. All substrates were plastered with Rapido Tynnpuss added with different colours. Table 1 below shows an overview of the marking of the specimens, type of substrate and the colour of the finishing mortars.

Table 1: overview of the marking of the specimens, type of substrate and the colour of the finishing mortar.

Specimen marked	Type of substrate	Colour of the finishing mortar
Series 1	Concrete B 45	Yellow/Gul
Series 2	Randers brick	Green
Series 3	Steni Terra foundation wall panel	Dark blue
Series 4	Ruukki Laser structural steel	Green
Series 5	Jackon Super EPS 60-80	Light blue

3. Laboratory testing

Bond strength was determined according to NBI method 1/1993, *Bond strength*, in a way that circular steel bricks (Ø 50 mm) were bonded to the different substrates. Before bonding, a core drill (diameter 50 mm) was used to drill through the finishing mortar layers into the substrates. Bond strength was then determined in a Lloyd universal test machine for five specimens of each substrate.

4. Results

Test results are shown in Table 2 – 6 below.

Table 2: Bond strength between Rapido Tynnpuss and concrete (see picture 3 in Appendix 1)

Specimen	Maximum load (N)	Bond strength (N/mm²)	Comments
1	4991	2,54	75 % fracture in the concrete and 25 % in Rapido Tynnpuss
2	5552	2,83	80 % fracture in the concrete and 20 % in Rapido Tynnpuss
3	5722	2,92	25 % fracture in the concrete and 75 % in Rapido Tynnpuss
4	5346	2,72	10 % fracture in the concrete and 90 % in Rapido Tynnpuss
5	5811	2,96	10 % fracture in the concrete and 90 % in Rapido Tynnpuss
Mean value		2,79	
Std. deviation		0,17	

Table 3: Bond strength between Rapido Tynnpuss and bricks (see picture 4 in Appendix 1)

Specimen	Maximum load (N)	Bond strength (N/mm ²)	Comments
11	1714	0,87	100 % fracture in the bricks
12	1570	0,80	100 % fracture in the bricks
13	1280	0,65	100 % fracture in the bricks
14	2236	1,14	100 % fracture in the bricks
Mean value		0,87	
Std. deviation		0,20	

One of the specimens had an irregularity in the substrate (see picture 4)

Table 4: Bond strength between Rapido Tynnpuss and Steni Terra foundation wall panel (see picture 5 in Appendix 1)

Specimen	Maximum load (N)	Bond strength (N/mm ²)	Comments
21	1125	0,57	50 % fracture in Steni Terra and 50 % in Rapido Tynnpuss
22	925	0,47	50 % fracture in Steni Terra and 50 % in Rapido Tynnpuss
23	920	0,47	30 % fracture in Steni Terra and 70 % in Rapido Tynnpuss
24	919	0,47	30 % fracture in Steni Terra and 70 % in Rapido Tynnpuss
25	985	0,50	30 % fracture in Steni Terra and 70 % in Rapido Tynnpuss
Mean value		0,50	
Std. deviation		0,05	

Table 5: Bond strength between Rapido Tynnpuss and Ruukki Laser structural steel (see picture 6 in Appendix 1)

Specimen	Maximum load (N)	Bond strength (N/mm ²)	Comments
31	4820	2,46	50 % fracture in Ruukki and 50 % in Rapido Tynnpuss
32	5754	2,93	50 % fracture in Ruukki and 50 % in Rapido Tynnpuss
33	2407	1,23	30 % fracture in Ruukki and 70 % in Rapido Tynnpuss
34	2639	1,34	30 % fracture in Ruukki and 70 % in Rapido Tynnpuss
35	3140	1,60	30 % fracture in Ruukki and 70 % in Rapido Tynnpuss
Mean value		1,91	
Std. deviation		0,75	

Table 6: Bond strength between Rapido Tynnpuss and EPS (see picture 7 in Appendix 1)

Specimen	Maximum load (N)	Bond strength (N/mm ²)	Comments
41	369	0,19	100 % fracture in EPS
42	379	0,19	100 % fracture in EPS
43	589	0,30	100 % fracture in EPS
44	496	0,25	100 % fracture in EPS
45	416	0,21	100 % fracture in EPS
Mean value		0,23	
Std. deviation		0,05	

5. Discussion

Generally, it's a challenge to state requirements for bond strength between a finishing mortar and a substrate as long as the tensile strength for the substrate can vary a lot (for example from steel/concrete to EPS). However, the bond strength should be higher than the lowest tensile strength in the undelaying layers. This means that fracture between substrate and the finishing layer should not occur.

The results from the laboratory testing of bond strength between Rapido Tynnpuss and substrates of concrete, bricks, Steni Terra foundation wall panel, Ruukki Laser structural steel and EPS show that Rapido Tynnpuss sticks good to all of the tested substrates.

6. Summary/conclusion

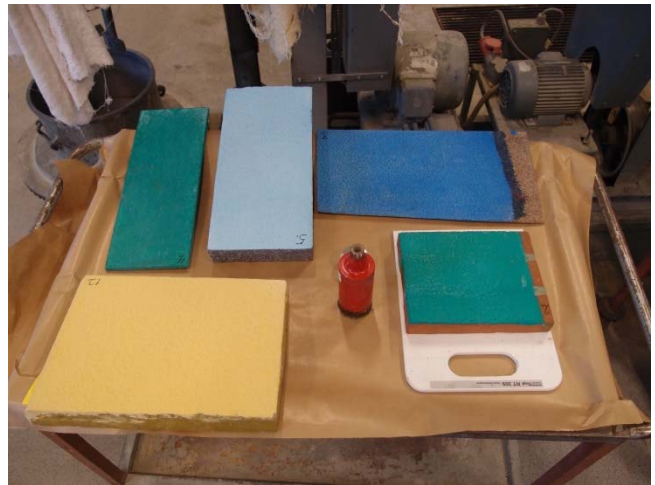
SINTEF Building and infrastructure has, on behalf of RVL Products AS, performed bond strength tests between Rapido Tynnpuss (thin finishing mortar) and substrates of concrete, bricks, Steni Terra foundation wall panels, Ruukki Laser structural steel sheets and Jackon Super EPS 60-80.

The results show that fracture occurred either in the substrates or in Rapido Tynnpuss. SINTEF assess, of this reason, that the bond strength properties for Rapido Tynnpuss is good.

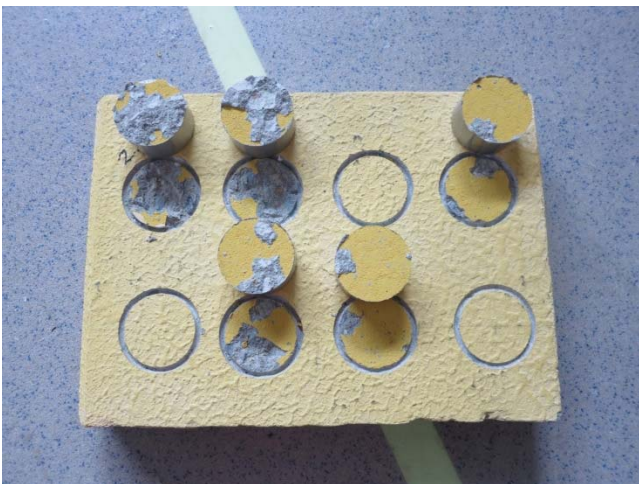
Appendix 1 **Pictures from testing of bond strength**



Picture 1: Received specimens



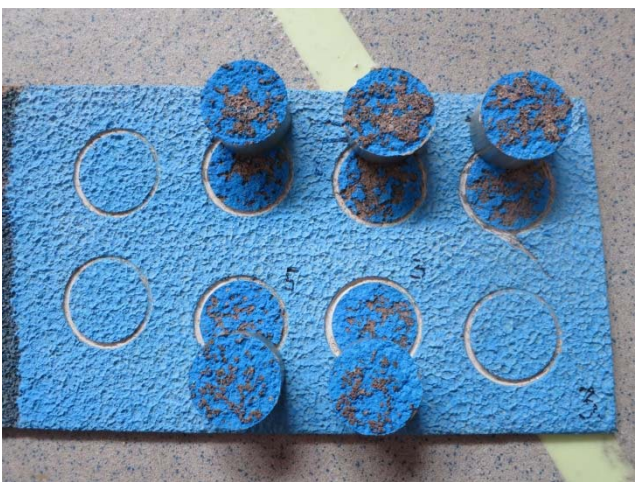
Picture 2: Selected specimens for testing



Picture 3: Substrate of concrete



Picture 4: Substrate of brick



Picture 5: Substrate of Steni Terra



Picture 6: Substrate of Ruukki Laser structural steel



Picture 7: Substrate of EPS



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