

Inspection report - Baku Metro November 2015



metro



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Superior Products Europe nv/sa

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International Conference
on the
History of Mathematics
2017



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International Conference on the History of Mathematics
2017

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1. Companies involved

Client:

Baku Metropolitan

Represented by: Mr. Zaur Mir Tofiq oglu Hüseynovun

H. Javid Avenue 33 A
Baku City - Azerbaijan



Distributor of Rust Grip® for Azerbaijan:

Superior Products Caspian LLC

Represented by: Rufat Abdullayev

6th Boyuk Qala street 11, Old City
AZ1001 Baku - Azerbaijan
<http://www.spcaspian.az>



Supervision during trainings, inspection and report by:

Superior Products Europe nv

Represented by: Stefan Rutten

Kampweg 123
B-2990 Wuustwezel - Belgium
<http://www.specoating.com>



Rust Grip® is produced by:

Superior Products International II

Represented by: J.E. Pritchett

10835 W. 78 th Street
Shawnee, KS 66214 - U.S.A.
<http://www.spicoatings.com>



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2. Description & Project History

In order to stop further damage by severe corrosion to the metal underground structure of the Metro in Baku, a first test project was set up by Superior Products Caspian during first week of April 2014.

The purpose of this pilot test application was to verify the durability and corrosion encapsulation ability of Rust Grip® on non-sandblasted heavy corroded dry metal parts in the underground tunnel complex.

Therefore one section, nr.PK 27+33+34, was selected by the Metro .

Rust Grip® was applied in 2 layers at average of 250µ DFT on the test patch. Evaluation was made after full curing adhesion and scratch tests. The Metro responsible engineers were pleased with the highly satisfactory results. Full description of this demo application is available upon request.

End of June 2014, decision was made by Mr. Zaur Mir Tofiq oglu Hüseynovun, the Chairman from the Baku Metro, after meeting and discussions with J.E. Pritchett, President of Superior Products International II, to continue further applications in the Metro. Contract was concluded between Baku Metropolitan and Superior Products International II to start this encapsulation project with purchase of three 20 foot containers Rust Grip® (2660 gallon each). Superior Products Caspian, in coordination with Superior Products Europe, started organizing the purchase of all the necessary materials and equipment in order to carry out this work properly and in safe conditions. In September 2014 the first 20 foot container with 2660 gallon Rust Grip® arrived in Baku.

First application training was held between 12 December 2014 till 19 December 2014 under supervision of Superior Products Europe. Purpose was to give training and understanding how Rust Grip® must be applied; and to assure that the coating system fully encapsulate all corrosion on dry and sound parts.

Upon arrival in July 2015 of the 2nd container Rust Grip®, an area of +/- 20.000 m² was treated. At the time of my 2nd visit, from Sunday 8th till Friday 13th November 2015, 41.000 m² have been treated with a total consumption of 687 pails (or 3435 gallon) of Rust Grip®.

Before the end of 2015, the 3rd container is supposed to arrive for having continuity in the applications.

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3. General situation before encapsulation of the rusted metal parts observed in December 2014

With reference to the first general description of the Metro project, dated December 2014, no salts were detected, therefore no special treatment was demanded with Chlor-Rid. All loose rust was manually removed using hammers, chisels and steel wire brushes.

4. General comment after observations during inspection in November 2015

The staff, who is in charge of the coating application at the Metro, is very well aware of the absolute must of a dry and clean substrate prior to apply Rust Grip®. They are very conscious about this and act very consistently. For example, wet or greasy parts have been not treated. Also very detailed notes and reports have been made every single night, indicating in which section the application has been performed, when they have started working on the 1st and 2nd layer application, when they have finished, who has done the application, how many m² have been treated and which nr. of Rust Grip® pail has been used, as well as each pail has been numbered.





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These records have been maintained every night and have been checked by representative staff from SP Caspian, as well as from responsible staff of the Metro. Below, as reference, one of the original daily report is shown:

"H.Aslanov – Əhmədli" mənzilinin 7 yolunda çuqun tubinqlərə vurulan korroziya əleyhinə "RUST GRIP" mastikasının (boyanın) çəkilməsi işinin gündəlik

XRONOLOGİYASI

"06" «noyabr» 2015-ci il

Təsərrüfat qatarının iş yerinə çatması	01 ⁵⁵
İş yerinin çəpərlənməsi, kəbellərin şitə qoşulması, kompressorla və sənaye tipli tozsoranla tozun alınması, avadanlıq və işarələrin üzərinin bağlanması, boya vedrələrinin mikserlə qarışdırılması	02 ²⁵
Rəngləmə işinin başlanması	02 ³⁰
Rəngləmə işinin başa çatması	04 ⁰⁰
Rəngvuran aqreqlərin yuyulması, iş yerinin və iş platformasının yığışdırılması	04 ¹⁶
Təsərrüfat qatarının iş yerindən depoya qayıtması	04 ²⁵
Rənglənən sahənin piketi	05,5 aşağı . PK <u>204+21</u> dan PK <u>204+41</u> dək
Rənglənmiş hissənin miqdarı (paqon metrə)	<u>205</u> p.m x <u>10,29</u>
Rənglənmiş hissənin miqdarı (m²)	<u>205,85</u> m²
İstifadə olunmuş boyanın miqdarı (vedrə sayı və nömrəsi)	<u>45</u> vedrə № <u>132, 133, 134, 135</u>
İstifadə olunmayan və anbara qaytarılmış boyanın miqdarı (vedrə sayı və nömrəsi)	<u>215</u> vedrə № <u>136</u>
İşçilərin sayı	nəfər

ƏSƏR-3: Məhdiyev Həsən Ə.
Əsaslı təmir xidmətinin nümayəndəsi

Məmməd Rəvəzi C.
"Superior Products Caspian" MMC-nin nümayəndəsi

(imza)
(imza)

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They keep also record per week as shown below in this partly translated example:

FOR Head of CAPITAL
Repairing Department
MAYSUM RASABOV

Əsaslı təmir xidmətinin rəisi
cənab Möhsün Rəcəbova

FOR GENERAL DIRECTOR
OF SUPERIOR PRODUCTS CASPIAN
ABDULLAYEV RUFAT

"Superior Products Caspian" MMC-nin baş direktoru
cənab Rəfiqə Abdullayeva

"H. Aslanov - Əhmədli" mənzilinin 7 yolunda çuqun tubinqlərə vurulan korroziya
aleyhinə "RUST GRIP" mastikasının (boyanın) çəkilməsi işinin hədəflənən
weakly

XRONOLOGİYASI STATEMENT

«06-06.» «noyabr.» 2015-ci il (3)

Application of Rust Grip
in H. Aslanov - Ahmadi
Address

	Ø 5,5	FROM	TO
Rənglənən sahənin piketi	60x10,29	PK 203+83	dan PK 204+41
Number of Application AREA.	40x14,22	PK 204+01	dan PK 204+41
	700plu	PK -	dan PK -
Rənglənmiş hissənin miqdarı (paqon metrə)	4	= 60 x 10,29 = 617,4 m ²	
Running meter of AREA	4	= 40 x 14,22 = 568,8 m ²	
Rənglənmiş hissənin miqdarı (m ²)		1186,2 m ²	
İstifadə olunmuş boyanın miqdarı (vedra sayı və nömrəsi)		= 20 = vedra № 116 + 135	
İstifadə olunmayan və anbara qaytarılmış boyanın miqdarı (vedra sayı və nömrəsi)		vedra № -	
Quantity and number of unused paints			

Bov-3: Məhdərov H. Ə.
Əsaslı təmir xidmətinin nümayəndəsi
REPRESENTATIVE OF CAPITAL Repairing

Abdullayev Rəfiqə Ə.
"Superior Products Caspian" MMC-nin nümayəndəsi
REPRESENTATIVE OF SPC.

(imza)
(imza)

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Finally they book also these reports very precisely per each month:

Statement of RUST GRIP application Metro tunnels for SEPTEMBER

Date	APPLICATION STATEMENT				
	Meter	sq/m	Address	Q-ty of pails	Number of pails
01.09.2015					
02.09.2015	18,5	729,64	Shaft N114 (Tunnel exit)	10	516-525
03.09.2015	15	154,35	KH.Aslanov-Akhmadli II	3	526-528
04.09.2015					
05.09.2015					
06.09.2015					
07.09.2015					
08.09.2015					
09.09.2015	20	284,4	KH.Aslanov-Akhmadli II	4	529-532
10.09.2015	20	284,4	KH.Aslanov-Akhmadli II	4	1+4
11.09.2015	17	262,32	KH.Aslanov-Akhmadli II	4	5+8
12.09.2015					
13.09.2015					
14.09.2015	20	284,4	KH.Aslanov-Akhmadli II	4	9+12
15.09.2015	8	196,08	KH.Aslanov-Akhmadli II	3	13-15
16.09.2015	20	284,4	KH.Aslanov-Akhmadli II	4	16-19
17.09.2015	20	205,8	KH.Aslanov-Akhmadli II	4	20-23
18.09.2015	20	205,8	KH.Aslanov-Akhmadli II	4	24-27
19.09.2015					
20.09.2015					
21.09.2015	20	205,8	KH.Aslanov-Akhmadli II	4	28-31
22.09.2015	19	211,23	KH.Aslanov-Akhmadli II	4	32-35
23.09.2015	13	190,65	KH.Aslanov-Akhmadli II	3	36-38
24.09.2015					
25.09.2015					
26.09.2015					
27.09.2015					
28.09.2015					
29.09.2015					
30.09.2015	10	245,1	Shaft N114 (Tunnel exit)	4	39-42
TOTAL	240,5	3744,37		59	

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5. Control of the Dry Film Thickness (DFT)

According to their recorded data, a total area of 41.000 m² have been executed at the time of my visit to the Metro during week 46.

In theory, when applying 2 layers of 150 micron WFT each (3 mils) for a surface area of 41.000 m², a total minimum consumption of 675 pails Rust Grip® is required. (having 5 % losses).

In practice, the consumption according to the treated area is registered to be 687 pails, which confirms the theoretical DFT of 150 micron.

Below some DFT measurements, taken on the most flat possible areas after calibration by use of plastic shim (calibrated at 255 micron), are shown.



170 μ



176 μ



150 μ



364 μ

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192 μ



174 μ



258 μ



230 μ

According to the SP Caspian and Metro staff confirmation, the application teams have never applied Rust Grip® with a consumption higher than 75 m²/pail (even less as shown below). Control calculation of the average spread rate, based on the data from the report of September, is shown below. (see copy under point 4.)

m ²	pails used	average/pail
729,64	10	72,96
154,35	3	51,45
284,40	4	71,10
262,32	4	65,58
196,08	3	65,36
205,80	4	51,45
211,23	4	52,81
190,65	3	63,55
3744,37	59	63,46

The coverage rate results in a minimum of 125 μ DFT but in practice thicker film has been recorded.

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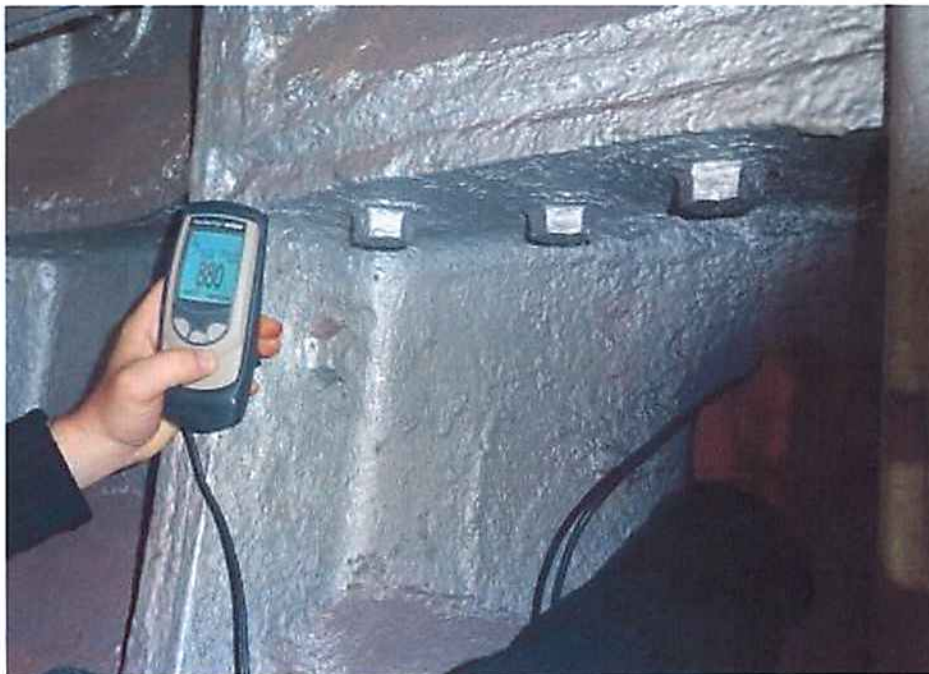
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It must be noted that, due to the very rough surface profile, in most areas it was impossible to find a smooth surface to make appropriate measurement by using a Delfesko PosiTector 6000 with Type 2 gauge.

This translates into much higher thickness measurements, as shown below.



880 μ

I can confirm that, during my visit, I have not seen 1 single check point having less than 150 μ DFT and never spotted an area showing corroded pin holes.

On next page you find some images after completion of different Metro sections.

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6. Conclusions

The involved people from Metro are open minded for creative solutions and are willing to invest in new solutions oriented to solve the structural condition of the Metro.

Although it is difficult to define the proper needed thickness of Rust Grip®, due to the high corrosion profile, I feel comfortable as they are doing a great job. I see no reason to hold the continuation of the application as no pin holes were observed after 1 year applications.

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The Metro staff have been well instructed about the steps to take for performing the application in accordance to specifications. The environmental conditions allow them to continue the application. I registered a RH of 55.2%, a Ta of 21.6°C, a Ts of 21.2 °C, and a Td of 12.2°C, which gives a temperature difference of $T_s - T_d = 8.9^\circ\text{C}$. This value is higher than the minimum of 5°C, considered as the minimum limit above dew point for performing the application of Rust Grip®.

7.Note

By change of the season, in some inspected areas, water infiltration and leakage problems were observed. These areas are "on hold" and workers are very well aware of it. The workers have a good attitude and are willing to learn.

Given the observed surface conditions, an application by using Moist Metal Grip has been performed as test case. More information about the test case application will be addressed in a separate report.

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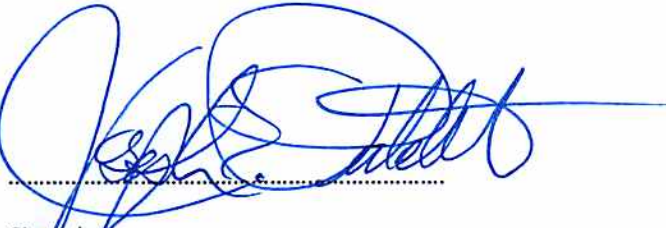
November 2015

Report was written and compiled by Stefan Rutten, Superior Products Europe NV, as an assigned representative of Superior Products International II.

.....
Signed

STAMP SPE

Approved and signed by J.E. Pritchett, President of Superior Products International II.



.....
Signed

Dec. 12-1-2015
.....

Dated



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Dec 2015



THE UNITED STATES OF AMERICA

DEPARTMENT OF THE INTERIOR

STANDARD FORM NO. 100

TO THE SECRETARY OF THE INTERIOR, WASHINGTON, D. C.

FROM THE DIRECTOR OF THE BUREAU OF LAND MANAGEMENT

RE: [illegible]

DATE: [illegible]

SUBJECT: [illegible]

[illegible handwritten notes]

