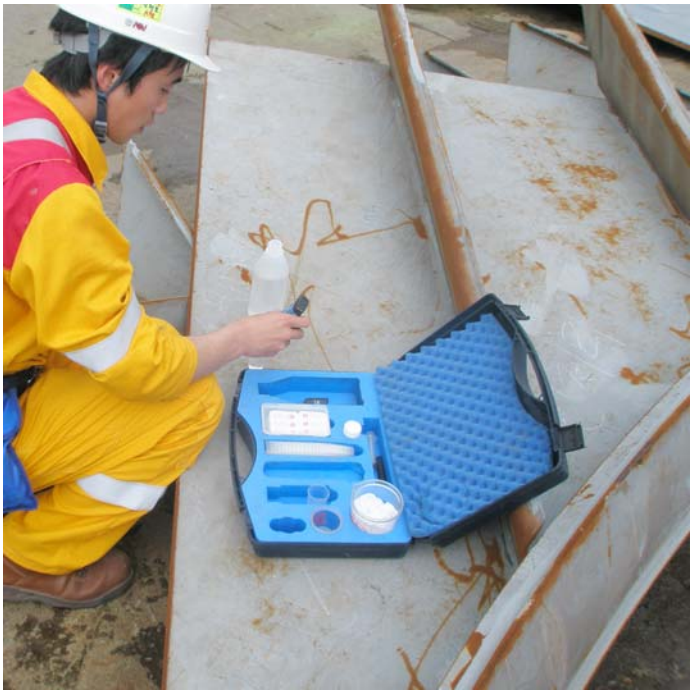
Report

Testing of Salt Levels about 100 mm appart

J. Eliasson

June 20, 2008



Background

It was assumed that the naturally doped steel present at marine locations would be generally consistently contaminated – at least within a short distance. For that reason the distance chosen for the in-situ test in the ISO8502-9 equivalence validation standard procedure was 100 mm. Tests were conducted in Japan that gave values that varied much more than expected – the distance though also being greater than 100 mm. Tests were therefore conducted in a shipyard in Korea under normal in-situ conditions to establish the variance in pairs of measurements about 100 mm apart.

Executive Summary

It was found that in fact the amounts of salts measured vary a lot between spots, also very close together. One panel had very good values in close proximity, but another panel and a block showed great variance.

It must be concluded that the In-Situ test would be unsuited as a validation tool unless the surfaces on which the validation is to be conducted is to be quality controlled and found evenly contaminated.

Salt Readings in Pairs **Readings in mg/m2**

Reading #	Panel I	Panel II	Block	Deviance
1	30			Very large
2	18			
3	6			Very large
4	24			
5	30			
6	18			
7		24		0
8		24		
9		6		0
10		6		
11			54	Very large
12			12	
13			42	Large
14			30	
15			12	Very large
16			30	
17			54	Large
18			60	
19			36	Very large
20			60	

Panel I was not suitable as a panel for validation tests in-situ, nor was the block found to be.

Panel II could have been used.

How to run a quality control to ensure that the surface on which the in-situ validation takes is now a new challenge. Is it solvable in a practical way?

Inspection

The salt reading was done using a ISO8502-9 method adopted in Korea, It involved using a larger volume of water, part of which was used to extract salt with a Bresle patch. The test solution then added back to the container with the remaining water, and the conductivity measured on the larger volume using a HANNA conductivity meter.
The gauge gave only whole numbers, and not decimals, hence there was an added deviance in the system only for that fact – but the deviation was much larger than for this to be the main issue.
The dwell time (wetness when measuring was about 1 ½ min, with 4 times in-and-out, and constant finger rubbing in between.
This method is not in harmony with the method in the equivalence validation standard practice, but it was consistently applied. I was not interested in the values in them selves, but the variance within 100 mm.
The distance between the patches were not measured to be exactly 100 mm, but were close enough for this evaluation.

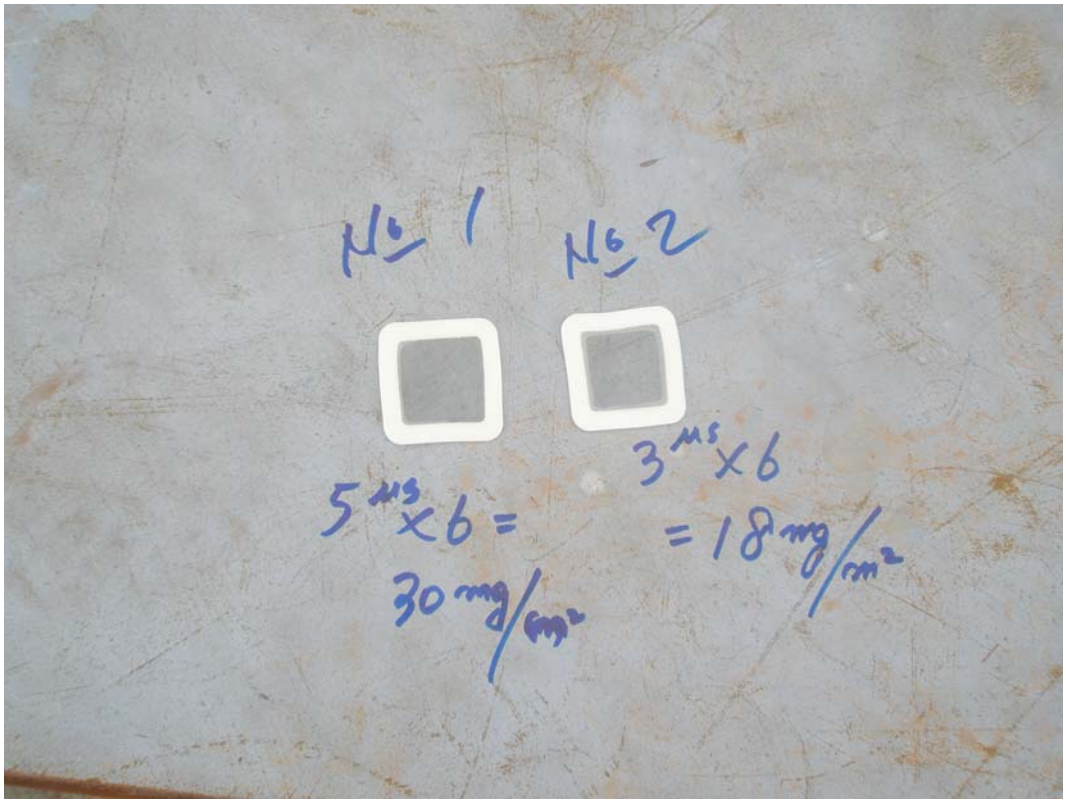
The patches were applied in pairs; 1+2, 3+4, 4+5, etc.

Measurements

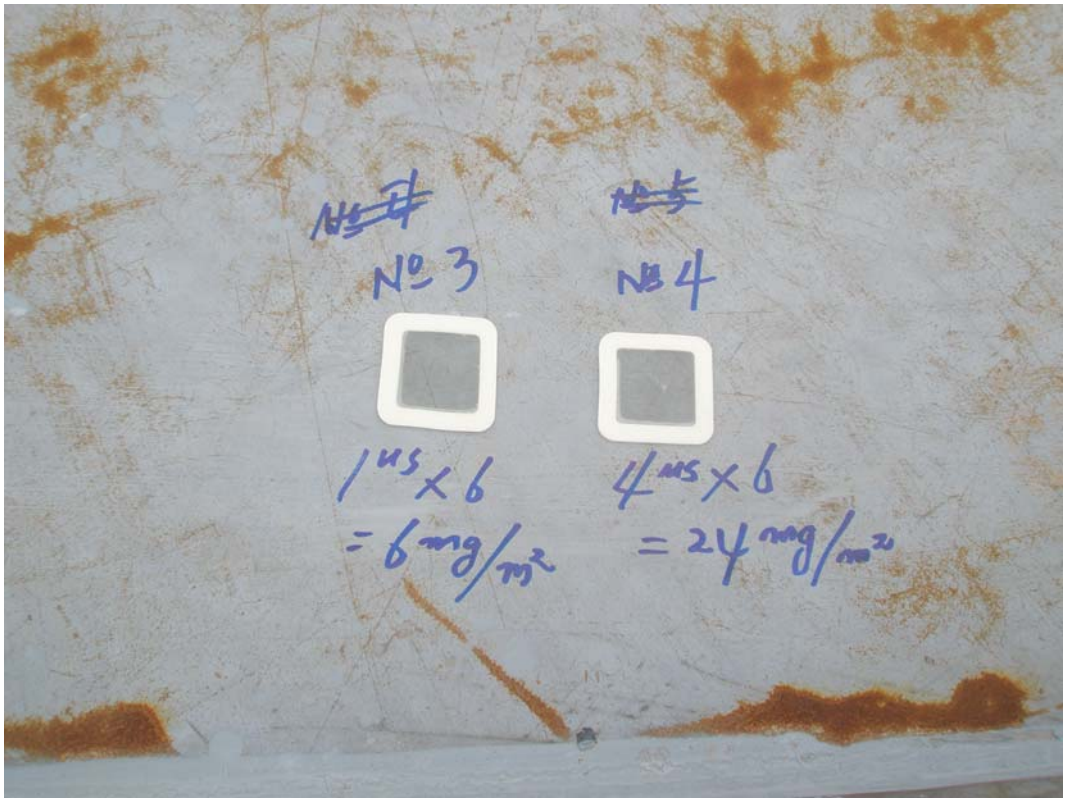
Salt Readings in Pairs **Readings in mg/m2**

Reading #	Panel I	Panel II	Block	Deviance
1	30			Very large
2	18			
3	6			Very large
4	24			
5	30			
6	18			
7		24		0
8		24		
9		6		0
10		6		
11			54	Very large
12			12	
13			42	Large
14			30	
15			12	Very large
16			30	
17			54	Large
18			60	
19			36	Very large
20			60	

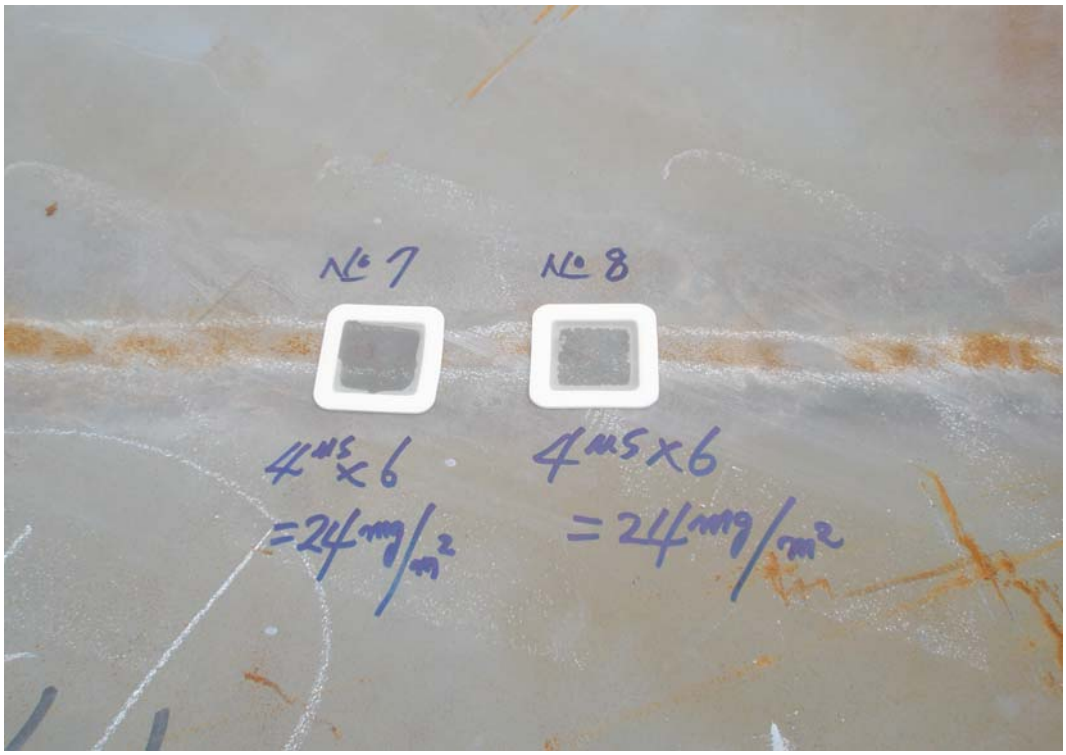
Shown is also the conductivity gauge.



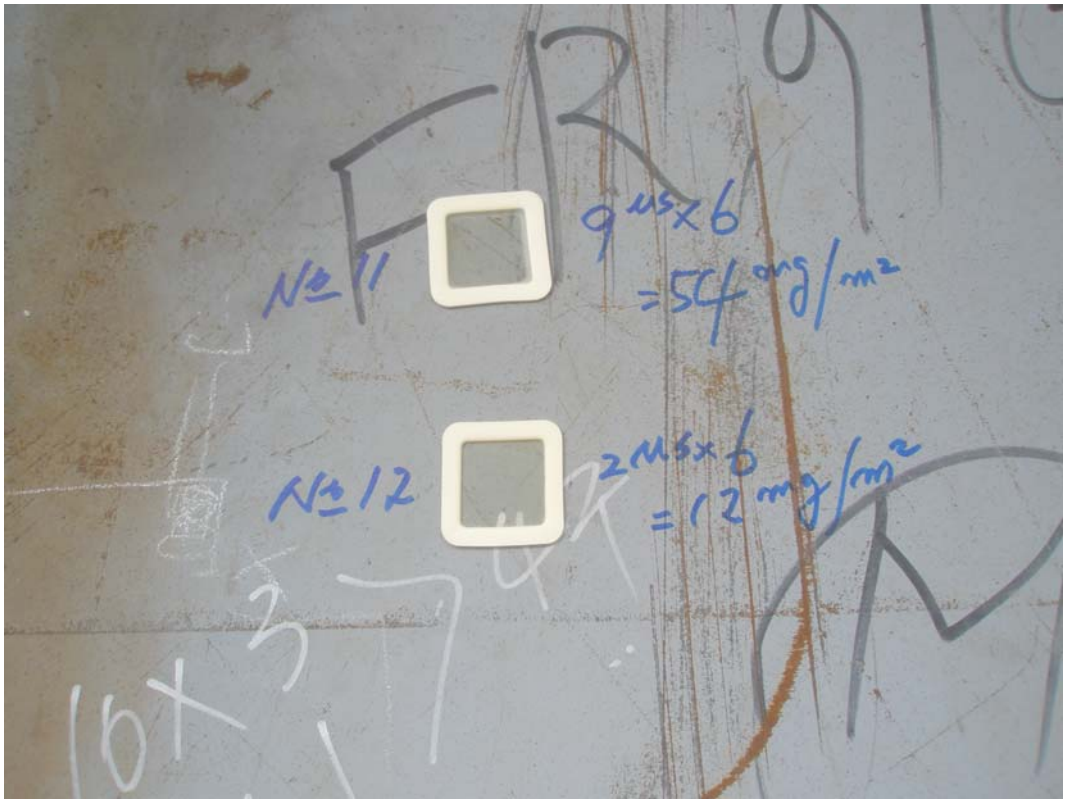
Panel I – Area that had been washed quite well by recent rain. Horizontal surfaces!



Above Panel I – Below Panel II 1st pair – also horizontal washed in recent rains, on a heat weld damaged spot.

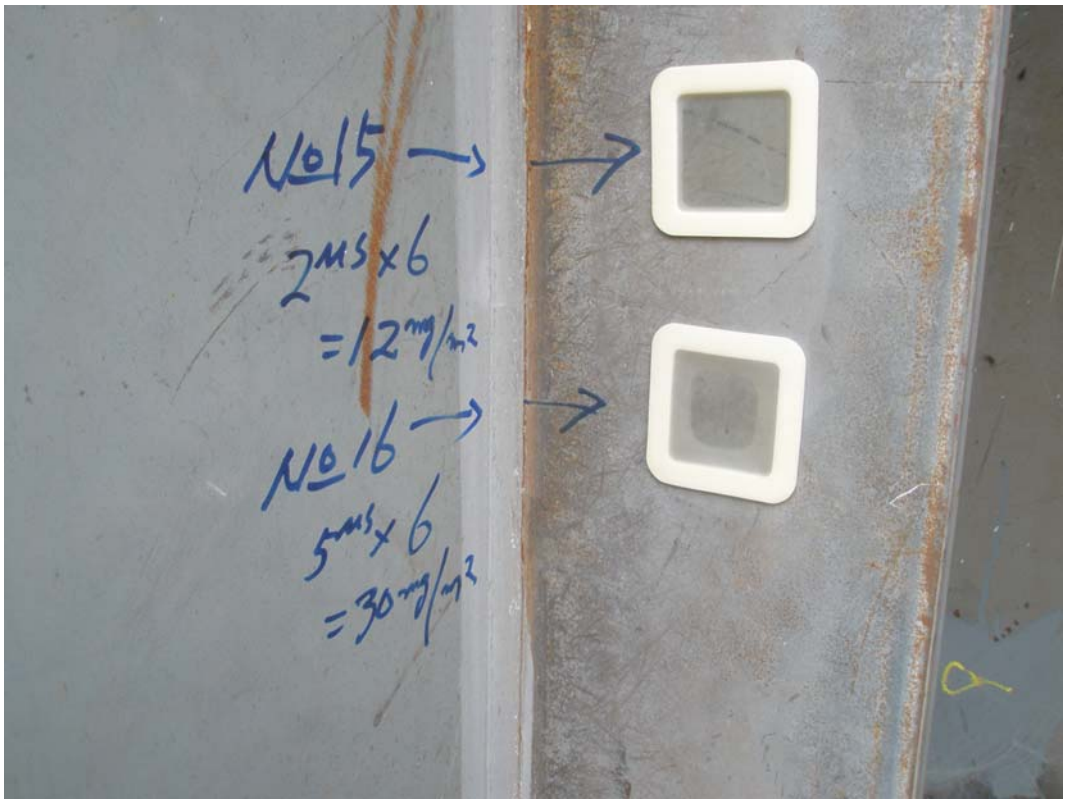


Panel II above on a rain protected spot – Below the block.



Block – Area where people touch with hands – access part.

On bracket – typically not an area touched much by hand.



Block on an area with rust stain contamination over-head -Not expected to be contaminated by human traffic! Below, outer bilge area on the bottom plate.

Attempts were made to measure on several types of surfaces. Intact shop primer, degraded shop primer, rusty parts, vertical, horizontal, overhead and bottom parts.

The variance found was well in excess of what had been expected!

J. Eliasson
June 20, 2008