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TEST REPORT

Report No. TFII-CR-00x/10/07/2567

Company	Speed Clean Company Limited
Test problem	Determine the corrosion rate of car air conditioner cleaning product
Test method	Tafel method
Test object	Speed Clean
Date of test	July 5, 2024

THIS REPORT is based on the tests performed on the specimens that were submitted to our laboratory.

The specimen:

Speed Clean solution was provided by customer.

Surface preparation for aluminum alloy:

The aluminium alloy part in the air conditioner was tested showed in Fig.1 . The size was 2.0 cm wide and 3.5 cm long. They were ground using abrasive paper no 240, 360 and 500, cleaned, and dried. The circular test area was prepared by masking the aluminium alloy with the polymer tape.

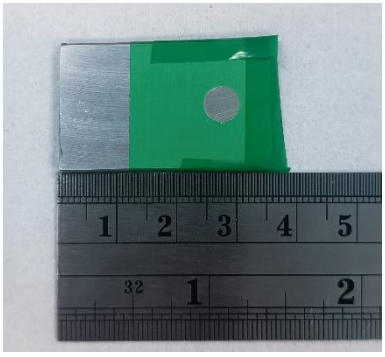

Fig.1 The aluminium alloy specimen

Electrochemical test and instrument :

1. The corrosion cell is a three-electrode cell, as shown in Fig. 2. which composed of
   1.1 The working electrode (WE): the aluminium alloy specimens
   1.2 The reference electrode (RE): the saturated calomel electrode (SCE) with salt bridge
   1.3 The counter electrode (CE): the platinum plate
2. The Electrochemical test:
   2.1 Measured the open circuit potential (OCP) for 55 minute
   2.2 The Tafel test, applied the potential from -250 mV to 250 mV / OCP at a scan rate of 60 mV/min.

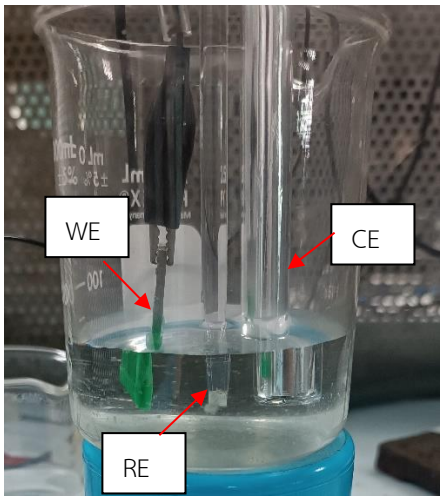

Fig.2 The corrosion cell

Tafel plot was shown in Fig.3. The corrosion potential, E_{corr} , the corrosion current density, i_{corr} , could be determined. The corrosion rate, CR, in mm/y was calculated from equation 1. The equivalent weight (EW) and the density (D) of the aluminum alloy (refer to aluminum alloy 3004) were 9.07 grams and 2.72 g/cm^3, respectively. i_{corr} was μA/cm^2, and the k constant was 3.27 x 10^{-3}, mm g/μA cm yr.

$$CR = k\frac{i_{corr}\ EW}{D} \qquad (1)$$

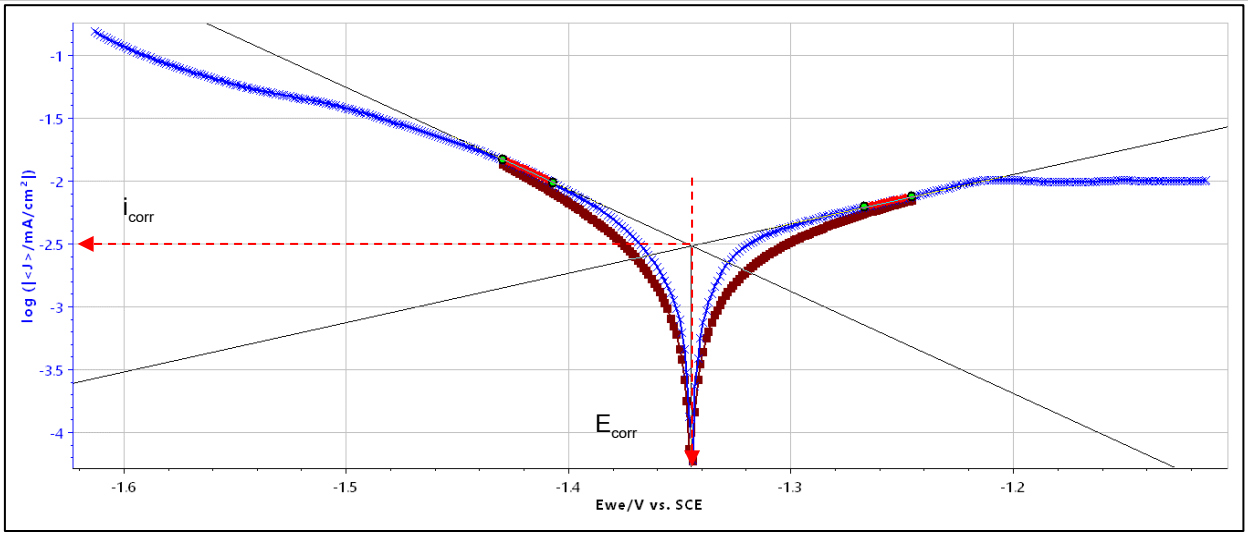

Fig.3 The Tafel plot

Result

The Tafel plots were shown in Fig. 4 . The corrosion potential (E_{corr}), corrosion current density (i_{corr}) and corrosion rate (CR) values obtained from the plots were shown in Table 1.

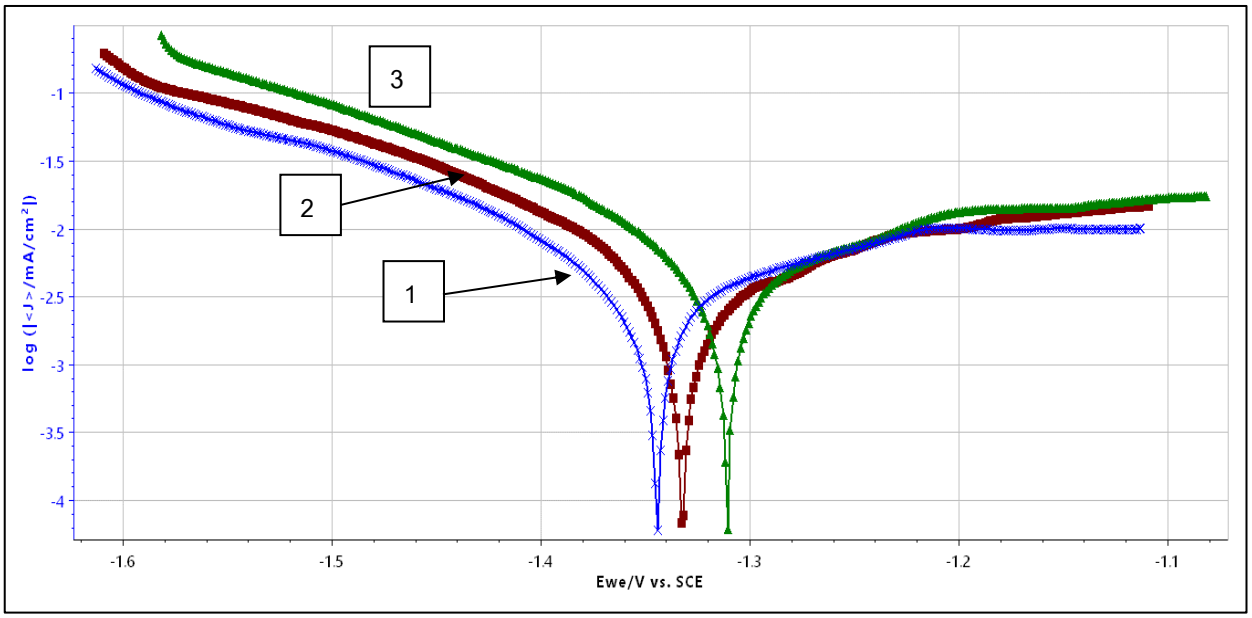

Fig. 4 The Tafel plots of the aluminium alloy (3 repetitions) were tested in Speed Clean solution.

Table 1. The corrosion potential (E_{corr}), corrosion current density (i_{corr}) and corrosion rate (CR) values of the aluminium alloy were tested in Speed Clean solution.

Test no.	E_{corr} (mV)	i_{corr} ($\mu A/cm^2$)	CR (mm/y)
1	-1,345	3.05	0.033
2	-1,322	3.84	0.042
3	-1,311	4.69	0.051
Avg.	-1,326	3.86	0.042

Conclusion

The average E_{corr} , i_{corr} and CR values of the aluminium alloy were tested in Speed Clean solution as -1,326 mV , 3.86 $\mu A/cm^2$ and 0.042 mm/y, respectively.

This report reflects our findings at the time and place of inspection only

Tested by

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