

## Corrosion Behavior of Carbon Steel Covered with Mill Scale by Using Electrochemical Noise Analysis

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Electrochemical Noise Analysis (ENA) is noticed as useful electrochemical measurement to detect the generation of localized corrosion. ENA is a method by which the variations of the electrode surface condition and the reaction rate are treated as potential or current fluctuation. Therefore, ENA should be to discuss the mechanism of the localized corrosion and be corrosion monitoring<sup>1, 2)</sup>.

Carbon steel is commonly used for various types of pipe. It is frequently used without removing mill scale which is oxide film made at hot rolled process. Therefore, it is important to study of stability of mill scale in flesh water. In flesh water, many kind of ions, such as  $\text{Cl}^-$ ,  $\text{SO}_4^{2-}$ ,  $\text{HCO}_3^-$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{SiO}_2$  are dissolved. Thus, it is important to investigate effect of every ions on corrosion of carbon steel in flesh water.

In the present paper, the corrosion diagnosis and the corrosion mechanism investigations of carbon steel covered with mill scale were performed by using ENA. It has been clarified that the types of corrosion could be discriminated by the measurements of potential time series and that the effects of the water quality on the corrosion could be discussed. Bicarbonate ions whose concentration is less than 10 ppm accelerate the corrosion of carbon steel covered with mill scale. Besides, the bicarbonate ions whose concentration is 100 ppm stabilize the mill scale. In neutral solution, the dissolved silica accelerates the anode reaction of carbon steel. Contrary to this in alkalie solution, the dissolved silica gives the corrosion resistance to the carbon steel with covered with mill scale.

### References

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