Evaluasi Pengendalian Korosi pada Pipa Baja Karbon dengan Tahapan Metode Chemical Cleaning dan Pasivasi = Evaluation Control of Corrosion on Carbon Steel Pipe with Chemical Cleaning and Pasivation Sequence Methods

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Abstrak

Korosi merupakan masalah utama dalam sistem resirkulasi air pendingin semi-tertutup saat sistem off-line dan baru dioperasikan. Dalam makalah ini, tahapan metode evaluasi chemical cleaning & pasivasi pada pengendalian masalah korosi untuk pipa baja karbon dalam sistem pendingin semi-tertutup dipelajari secara ekstensif selama pra-comissioning. Hasil penelitian menunjukkan bahwa citric acid dan EDTA, sebagai chemical cleaning efektif menghilangkan tubercules oksida besi dan karat yang terakumulasi selama kegiatan fabrikasi, penyimpanan, dan kontruksi. Pada tahap selanjutnya, poly- and ortho-phosphate bersama dengan zinc sebagai inhibitor korosi pasivasi membentuk lapisan film pelindung chemi-absorbed pada permukaan baja karbon. Pengaruhnya pada pipa baja karbon dipelajari melalui nilai target analisis air dan corrater monitoring. Analisa kualitas air dan corrater monitoring menunjukkan konsentrasi Iron content rata-rata 593,63 ppm yang dijaga setelah chemical cleaning dan laju korosi 2,34 mpy diperoleh setelah pasivasi. Hasil uji korosi ditampilkan menggunakaan teknik potensiodinamik. Pengarang menganalisa perbandingan tiga (3) tahapan kategori sampel, yaitu pre cleaning, chemical cleaning, dan pasivasi. Pada kurva tafel plot jelas terlihat langsung laju korosi perbedaannya. Pengurangan laju korosi disebabkan karena pembentukkan lapisan film pelindung oleh inhibitor dan stabilisasi lapisan film pelindung. Studi impedansi arus AC mendukung adanya peningkatan lapisan pada permukaan baja karbon dengan inhibitor, membentuk film pelindung. Verifikasi lebih lanjut dengan karakterisasi permukaan menggunakan spektrum SEM dan EDS pada permukaan baja karbon dengan inhibitor menunjukkan puncak spektrum elemen O, P, Zn, dan Ca, disamping puncak Fe.

.....Corrosion are main problems on carbon steel pipes in the recirculating semi-closed cooling water system when the system is off-line and newly operated. In this paper, chemical cleaning & passivation evaluation of sequence method on control of these problems for carbon steel pipes in the recirculating semi-closed cooling water system was extensively studied during precommissioning. The results showed that citric acid and EDTA, as chemical cleaning effectively remove iron oxide tubercles that have accumulated during fabrication, storage, and construction activities. At the same time, elevated levels of poly- and ortho-phosphate are maintained along with zinc as corrosion inhibitor to develop a chemi-absorbed passivating protective film on the carbon steel surface. The influence of these on carbon steel pipes were studied through water analysis and corrater monitoring. Water analysis and corrater monitoring showed that iron content 593.63 ppm are maintained after cleaning and corrosion rate of 2.34 mpy was obtained after passivation. The results of corrosion tests using potensiodynamic technique are presented. Authors analized in sequence different three parts of the features samples carbon steel such as pre-cleaning, chemical cleaning, and simulated passivation. These are clearly distinguished on the tafel plot of an instantaneous corrosion rate. The decrease is caused by the formation of a protective film with the participation of the inhibitor and a subsequent stabilization of these film. AC impedance study by EIS supports the increase in

surface coverage of the carbon steel surface by the inhibitor, forming a protective film. Further verification comes from the surface characterization of the inhibited metal surface by SEM and EDS spectrum revealed O, P, Zn, and Ca, beside Fe peaks.