Studi mekanisme kelekatan dan perlindungan dari sistem cat antikorosi dan anti-fouling pada baja karbon struktural di lingkungan laut = Study of adhesion and protection mechanism of anti-corrosion and anti-fouling paint systems on structural carbon steel in marine environment / Sandra Devanny Utomo

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Abstrak

ABSTRAK
Baja karbon adalah jenis material baja yang cukup mudah diperoleh dan banyak digunakan sebagai komponen struktural. Namun jika digunakan di lingkungan terbuka, misal untuk infrastruktur di laut, baja karbon rentan terhadap serangan korosi atmosferik dan biofouling terutama pada kondisi lingkungan dengan polutan yang tinggi. Metode pengecatan adalah salah satu bentuk perlindungan untuk baja karbon terhadap serangan korosi di lingkungan laut. Penelitian ini menginvestigasi daya lekat dan kemampuan perlindungan korosi dari tiga sistem cat multilapis yang umum diaplikasikan pada struktur baja di laut, terdiri dari cat zinc-rich, epoxy, polyurethane dan silyl acrylate anti-fouling. Metode pengujian mencakup uji tarik cat, pengukuran EIS dan polarisasi, uji celup, uji sembur garam, serta pengamatan makro dan karakterisasi SEM/EDS, yang seluruhnya dilakukan dalam kurun waktu 4 bulan. Hasil penelitian menunjukkan bahwa sistem cat inorganic zinc silicate epoxy mastic dan zinc-epoxy epoxy mastic polyurethane memiliki ketahanan korosi yang baik mdash;terutama di lingkungan atmosferik mdash;dengan mekanisme proteksi gabungan barrier dan galvanik. Sedangkan sistem cat epoxy primer polyurethane anti-fouling memiliki kekuatan adhesif dan ketahanan korosi yang buruk, namun efektif dalam menangkal penempelan fouling di lingkungan terendam.
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ABSTRACT
Carbon steel is a type of steel that is widely available and employed as a structural component. However, if used in open air environments, for example for marine infrastructure, carbon steel is susceptible to atmospheric and biofouling corrosion especially in highly polluted environments. Painting method is one form of protection for carbon steel against corrosion attacks in the marine environment. This study investigates paint adhesion and corrosion protection performance of three multilayer paint systems commonly applied to marine steel structures, comprising zinc rich, epoxy, polyurethane and silyl acrylate anti fouling paints. The test method encompassed the pull off test, EIS and polarization measurements, immersion test, salt spray test, and macroscopic observation and SEM EDS characterization, all of which were carried out over a period of 4 months. The results exhibited that the inorganic zinc silicate epoxy mastic and zinc epoxy epoxy mastic polyurethane paint systems has good corrosion resistance mdash particularly in atmospheric environments mdash by incorporating barrier properties and galvanic protection mechanisms. While the epoxy primer polyurethane anti fouling paint system has poor adhesive strength and corrosion resistance, it is effective in preventing fouling attachment in submerged environments.