Pengaruh perbedaan metode surface cleaning terhadap ketahanan korosi dan kekuatan adhesi pada substrat baja ASTM A36 yang dilapisi glass-flake epoxy = Effect of various surface cleaning methods on corrosion resistance and adhesion strength of glass-flake epoxy coated ASTM A36 steel substrate

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Abstrak

Baja ASTM A36 merupakan mild carbon steel yang banyak digunakan pada sektor infrastruktur, namun demikian baja karbon memiliki ketahanan korosi yang lebih rendah dibandingkan dengan jenis baja lainnya, yang menyebabkan material ini rentan terhadap korosi dalam lingkungan atmosferik. Oleh sebab itu, untuk meningkatkan ketahanan korosinya, baja ASTM A36 dapat dilapisi dengan glass flake epoxy. Penelitian ini bertujuan untuk mempelajari pengaruh perbedaan metode surface cleaning terhadap kekuatan adhesi glass flake epoxy yang diaplikasikan pada substrat baja tersebut dan ketahanan korosi yang dihasilkannya. Dalam penelitian ini diterapkan 5 (lima) jenis metode surface cleaning yaitu: (i) solvent cleaning, (ii) hand tool cleaning, (iii) power tool cleaning, (iv) power tool to bare metal cleaning, serta (v) abrasive blast cleaning. Selanjutnya, dilakukan proses pengukuran kekasaran permukaan dari masing-masing sampel baja ASTM A36 menggunakan metode field test, sebelum diaplikasikan cat dilakukan pengecekan kondisi lingkungan terlebih dahulu (dry and wet temperature, steel temperature, dew point temperature, serta relative humidity), kemudian glass-flake epoxy diaplikasikan pada permukaan substrat baja menggunakan roller paint brush. Setelah itu, dilakukan pengukuran wet dan dry film thickness. Metode analisis data dilakukan per lima sampel dari masing-masing pengujian yang dilakukan yakni pengujian salt spray, pengujian electrochemical impedance spectroscopy, serta dua pengujian adhesi yaitu pull off adhesion dan tape test test. Hasil penelitian menunjukkan bahwa kemampuan organic coating dipengaruhi oleh perbedaan metode surface cleaning yang diterapkan. Abrasive blast cleaning memiliki ketahanan korosi yang paling baik dengan rata-rata pelebaran (creepage) korosi paling rendah yakni 0.49 mm yang termasuk ke dalam rating number 9, dan kekuatan adhesi rata-rata tertinggi yaitu 3.16 MPa. Dengan demikian dapat disimpulkan bahwa, ketahanan korosi dipengaruhi oleh tingkat kebersihan, sementara kekuatan adhesi dipengaruhi oleh tingkat kekasaran.
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ASTM A36 steel is a mild carbon steel that is widely used in the infrastructure sector; however, carbon steel has a lower corrosion resistance compared to other types of steel, which makes this material susceptible to corrosion in atmospheric environments. Therefore, to improve its corrosion resistance, ASTM A36 steel can be coated with glass flake epoxy. This research aims to study the effect of different surface cleaning methods on the adhesion strength of glass flake epoxy applied to the steel substrate and the resulting corrosion resistance. In this research, five types of surface cleaning methods were applied, namely: (i) solvent cleaning; (ii) hand tool cleaning; (iii) power tool cleaning; (iv) power tool to bare metal cleaning; and (v) abrasive blast cleaning. Subsequently, the surface roughness measurement process for each ASTM A36 steel sample was carried out using the field test method. Prior to applying the paint, environmental conditions were checked first (dry and wet temperature, steel temperature, dew point temperature, and relative humidity), and then glass-flake epoxy was applied to the surface of the steel substrate using a roller

paint brush. Afterward, wet and dry film thickness measurements were taken. The data analysis method was carried out on five samples from each test carried out, namely salt spray testing, electrochemical impedance spectroscopy testing, and two adhesion tests, namely pull-off adhesion and tape test tests. The results show that the organic coating ability is influenced by the different surface cleaning methods applied. Abrasive blast cleaning has the finest corrosion resistance with the lowest average corrosion creepage of 0.49 mm, which is included in rating number 9. In addition, the resulting average adhesion strength is also high at 3.16 MPa. It can be concluded that corrosion resistance is influenced by the degree of cleanliness, while adhesion strength is influenced by the degree of roughness.